



# **NEBOSH CERTIFICATE IN FIRE SAFETY & RISK MANAGEMENT**

**KEYPOINTS & EXAMPLE EXAM TYPE  
QUESTIONS**

# Unit FC1: Fire safety and risk management

## Element 1: Managing fire safety

### Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Outline the moral, legal and financial consequences of inadequate management of fire safety
- Outline the legal framework for the regulation of fire safety in new, altered and existing buildings (including government guidance)
- Describe the roles and powers of enforcement agencies and other external agencies in relation to fire safety
- Outline the key features of a fire safety policy
- Outline the main sources of external fire safety information and the principles of their application
- Explain the purpose of, and the procedures for, investigating fires in the workplace
- Explain the legal and organisational requirements for recording and reporting fire related incidents.

### Content

#### 1.1 The moral, legal and financial consequences of inadequate management of fire Safety

- Financial implications of false alarms (such as possible penalties that may be imposed, business interruption, etc.)
- The size of the fire safety 'problem' in terms of the numbers of fire-related fatalities and injuries and environmental damage
- The duty of care owed by the occupier of a building
- Costs of inadequate management of fire safety including loss of business continuity.

#### 1.2 The legal framework for the regulation of fire safety in new, altered and existing buildings

- Regulatory Reform (Fire Safety) Order 2005, fire safety regulations (when made under the Regulatory Reform (Fire Safety Order 2005)), Communities and Local Government practical fire safety guidance: their relationships and relative status or alternative related local guidance
- Meaning of, and duties of, 'responsible person' under the Regulatory Reform (Fire Safety) Order 2005 (If studied in Scotland or Northern Ireland then the relevant local legislation would be studied but our package focuses on England and Wales.
- Absolute and qualified duties: 'reasonably practicable'.

### **1.3 The roles and powers of enforcement agencies and other external agencies in relation to fire safety**

- Fire and Rescue Authority, Health and Safety Executive, local authorities, Fire service maintained by the Secretary of State for Defence, fire inspector authorised by the Secretary of State, Environment Agency and insurance companies
- The powers of inspectors under the Regulatory Reform (Fire Safety) Order 2005
- The powers of authorised officers under the Fire and Rescue Services Act 2004, to enter premises in an emergency for fire-fighting, to obtain information for the purpose of investigating the causes of a fire and the reason for its progression
- Enforcement; notices (alterations, enforcement, prohibition):
  - conditions for serving
  - effects
  - procedures
  - rights and effects of appeal
  - role of magistrates court
  - penalties for failure to comply.

### **1.4 The key features of a fire safety policy**

- Responsibility for fire safety within an organisation and the arrangements for ensuring fire safety. To include arrangements for:
  - planning
  - organisation
  - control
  - monitoring
  - review
  - arrangements for vulnerable people
  - degraded systems planning.

### **1.5 Main sources of external fire safety information and the principles of their application**

- Communities and Local Government practical fire safety guidance or alternative related local guidance.
- British Standards for fire safety
- The principles of application of local guidance including:
  - implications and/or dangers of applying different parts of different guidance documents as a solution
  - appropriate guidance applicable to premises
  - applying guidance in a proportional manner
  - keeping up-to-date with guidance and standards

### **1.6 The purpose of, and the procedures for, investigating fires in the workplace**

- Purpose of investigating fires in the workplace
- Basic fire-related investigation procedures – procedural differences and definitions (e.g., fatal and non-fatal fires, accidental or arson fires and false alarms)
- Investigation preparation, preserving the fire scene
- Liaison and working protocols with the police, fire officer, HSE, public utilities, insurance investigators, forensic services and other specialists
- Identifying the underlying causes of the fire
- Remedial actions to prevent recurrence.

## 1.7 The legal and organisational requirements for recording and reporting fire related incidents

- The requirements, process and procedures for the statutory recording and reporting of fire-related injuries, fatalities and dangerous occurrences in the workplace
- Internal organisational process and procedures for recording and reporting fire related fatalities, major injuries or dangerous occurrences
- Accident book, fire logbook, general incident or occurrence book, appropriate forms (such as) F2508
- Use and review of fire safety risk assessments.

### Example exam type questions

1. (a) For **BOTH** an alterations notice and a prohibition notice, **outline**:
  - (i) the circumstances in which an enforcement officer may serve the notice; **(2)**
  - (ii) the types of action that the notice may require of the recipients; **(2)**
  - (iii) the effect on the notice of lodging an appeal against it. **(2)**

(b) **Outline** the possible penalties for failure to comply with any enforcement notice issued under the Regulatory Reform (Fire Safety) Order 2005 or the Fire (Scotland) Act 2005. **(2)**
2. (a) **Outline** possible financial implications of high numbers of false fire alarm activations in a workplace. **(4)**

(b) **Outline** possible adverse effects on the behaviour of occupants of a workplace during a fire alarm where there has previously been a number of false fire alarm activations. **(4)**
3. (a) **Outline** what is meant by the term 'degraded systems planning'. **(2)**

(b) **Outline** arrangements that should be implemented if a smoke detector head is not working. **(3)**

(c) Other than smoke detectors, **identify** fire safety-related systems that should be considered for degraded systems planning. **(3)**
4. **Outline** the typical content of the 'arrangements' section of a fire safety policy. **(8)**
5. Practitioners may use different guidance documents when devising protective and preventive measures to control fire safety risk. These documents may come from their own or other countries. **Outline** what should be considered when consulting the guidance from these documents. **(8)**
6. **Outline** key features of a fire safety policy. **(8)**
7. **Outline** reasons for investigating a major fire that has occurred in a workplace. **(8)**
8. **Outline** issues that should be considered by a fire and rescue service before starting an investigation into a serious fire at a workplace. **(8)**

## Element 2: Principles of fire and explosion

### Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Explain the principles of the combustion process in relation to fire safety
- Explain the principles and conditions for the ignition of solids, liquids and gases
- Identify the classification of fires
- Describe the principles of fire growth and fire spread
- Outline the principles of explosion and explosive combustion.

### Content

#### 2.1 The principles of the combustion process in relation to fire safety

- The concept of the fire triangle
- The chemistry of combustion, chemical reactivity, the conditions for the maintenance of combustion, examples of combustion products in relation to combustion reaction conditions (complete and incomplete reaction); exothermic reaction releasing heat energy; oxidising agents/materials
- The stages of fire: induction, ignition, fire growth, steady state, and decay.

#### 2.2 The principles and conditions for the ignition of solids, liquids and gases

- Meaning and relevance of flash point, fire point and ignition point (kindling point); auto ignition temperature; vapour density; vapour pressure; flammable liquid categories; flammable; upper flammable limit; lower flammable limit; combustion
- The conditions required to cause the ignition of combustible solids, flammable liquids and gaseous materials
- The methods of preventing or controlling ignition of combustible solid and flammable liquid and gaseous materials in relation to their physical and chemical properties
- The properties and safe storage of liquefied petroleum gas (LPG) – also see Element 3.2.

#### 2.3 The classification of fires

- The classification of fire according to its fuel source.

#### 2.4 The principles of fire growth and fire spread

- Factors that influence fire growth rates and smoke movement:
  - building design (such as cavities, ducts, shafts)
  - insulated core panels
  - construction materials
  - internal linings
  - ventilation levels
  - contents of the premises

- Methods of heat transfer; conduction, convection, radiation and direct burning and how they contribute to fire and smoke spread through buildings and to neighbouring properties
- The development of a fire under free burning conditions and a fire in enclosed conditions
- The conditions in which flashover and backdraught may occur.

## 2.5 The principles of explosion and explosive combustion

- Meaning of deflagration and detonation
- Common materials involved in explosions (such as flammable vapours, gases, dusts)
- The mechanism of types of explosion such as gas and vapour explosion (including boiling liquid expanding vapour explosion - BLEVE) and dust explosion (including primary and secondary explosion)
- The principles of preventing explosions:
  - good housekeeping
  - good ventilation
  - safe storage
  - handling of explosive materials
  - control of detonation sources
  - cooling
  - inerting, including the advantages and disadvantages of reduced oxygen atmospheres
- The principles for controlling explosions:
  - suppression (inerting)
  - venting (pressure relief valves, bursting discs, explosion venting panels)
  - containment
  - cooling.

### Example exam type questions

1. **Identify FOUR** methods by which heat may be transferred during a fire **AND describe** how **EACH** can cause the fire to spread. **(8)**

2. A fire risk assessment of a school's textiles classroom has identified that small quantities of flammable liquids such as paints, varnishes and adhesives are being used.

(a) **Give** the meaning of the term 'flashpoint'. **(2)**

(b) **Give** the meaning of the term 'auto-ignition temperature'. **(2)**

(c) **Outline** practical measures that should be considered in order to help reduce the risk from the storage of the flammable liquids. **(10)**

(d) **Identify** ways in which the occupants of the school could be at risk of harm from fire. **(6)**

3. **Explain** the following stages of a fire:

(a) growth; **(10)**

(b) steady state; **(5)**

(c) decay. **(5)**

4. A fire risk assessment at a bakery has determined that there is a significant risk of a flour dust explosion. **Outline** measures that could be taken in order to minimise the risk of a flour dust explosion. **(8)**

5. a) **Outline** how suitable wall lining materials could help minimise the risk from fire. **(3)**

(b) **Identify** types of wall lining material that could be used on a means of escape. **(5)**

(c) **Outline** how compartmentation in a building may be compromised. **(5)**

(d) **Describe** how a fire may spread to a neighbouring building. **(3)**

(e) **Outline** means of preventing a fire from spreading to a neighbouring building.

6. **Give** the meaning of the following terms:

(a) flashpoint; **(2)**

(b) auto-ignition temperature; **(2)**

(c) upper flammable limit (UFL); **(2)**

(d) lower flammable limit (LFL). **(2)**

7. (a) **Give** the meaning of the terms:

(i) upper flammable limit (UFL); **(2)**

(ii) lower flammable limit (LFL). **(2)**

(b) **Identify** properties of liquefied petroleum gas (LPG). **(4)**

8. (a) **Identify** the components of the fire triangle. **(3)**

(b) **Explain** the conditions required for a combustion process to be maintained. **(5)**

# Element 3: Causes and prevention of fires and explosions

## Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Explain the causes of fires and explosions in typical work activities
- Outline appropriate control measures to minimise fire and explosion risks.

## Content

### 3.1 The causes of fires and explosions in typical work activities

- Common sources of ignition of accidental fires including:
  - electrical appliances and installations
  - lightning
  - cooking
  - heating and lighting
  - smoking
  - overheating of machinery
  - spontaneous ignition of oil and solvent soaked materials
  - hot work
- Sources of fuel including:
  - paper and cardboard
  - furniture
  - fixtures and fittings
  - electrical insulation
  - structural materials
  - wall and ceiling linings
  - piped gas supply
  - cylinders of flammable gas
  - flammable chemicals, liquids and solvents
- Sources of oxygen including:
  - oxygen levels in the air
  - natural ventilation
  - forced ventilation or air-conditioning systems
  - oxidising materials
- Factors influencing the severity and frequency of an arson attack:
  - location
  - security
  - access control
- Fire and explosion risks from flammable materials in use, storage and transport within the workplace
- The concept of fire load



- Fire risks in construction and maintenance work:
  - site storage of combustible and flammable materials such as LPG cylinders and other gases; drums of fuel
  - waste disposal considerations
  - demolition hazards
  - use of oxy-fuel equipment
  - temporary electrical installations.

### 3.2 Appropriate control measures to minimise fire and explosion risks

- Control of sources of ignition e.g.,
  - intrinsically safe electrical equipment for use in flammable and explosive atmospheres; use of mobile phones; maintenance and portable appliance testing (PAT) of portable electrical appliances
  - designated smoking areas; use of fire proof cigarette bins
  - shielding to block radiant heat and sparks
  - maintain separation of ignition sources and fuel sources
- Control of sources of fuel:
  - safe storage, transport and use of flammable, highly flammable and combustible materials
  - design and installation of storage facilities
  - inspection and maintenance programmes, safe/correct waste disposal methods
  - housekeeping
  - control of fire load
- Control of sources of oxygen including
  - closing doors and windows
  - shutting off ventilation/air conditioning systems/ducting (also see Element 4.1)
  - safe use and storage of oxidising materials
- Safe systems of work; safe-operating procedures; planned preventive maintenance programmes; management of contractors; permits-to-work; provision of information and training to employees and others; maintaining fire protection systems during maintenance; construction work on an existing building
- Actions to minimise risks from arson.

#### Example exam type questions

1. Fire and smoke damage has occurred in the premises of a large manufacturing organisation, consisting of a timber workshop and storage areas on the ground floor and office facilities on the first floor. A subsequent investigation has revealed that the fire was started accidentally. It was also found that, despite the fire alarm being activated promptly, many occupants on the first floor took up to 15 minutes to evacuate the building.

(a) **Identify** possible sources of ignition that may have been present when the fire started in the workshop. **(10)**

(b) **Outline** possible reasons why the occupants on the first floor were slow to evacuate the building. **(10)**

2. A fire risk assessment is being conducted on a work process that involves dangerous substances. It has been determined that it is not possible to avoid the use of the substances or to reduce the quantities involved in the process.

**Outline** measures that should be considered to help reduce the fire risk from the dangerous substances. **(8)**

3. A fire risk assessment of a school's textiles classroom has identified that small quantities of flammable liquids such as paints, varnishes and adhesives are being used.

(a) **Give** the meaning of the term 'flashpoint'. **(2)**

(b) **Give** the meaning of the term 'auto-ignition temperature'. **(2)**

(c) **Outline** practical measures that should be considered in order to help reduce the risk from the storage of the flammable liquids. **(10)**

(d) **Identify** ways in which the occupants of the school could be at risk of harm from fire. **(6)**

4. (a) **Outline** measures that can be taken to help reduce the risk of fire from electrical equipment. **(6)**

(b) **Identify** suitable extinguishing agents that should be used on fires involving electricity.

5. The premises of a large manufacturing organisation has been damaged by fire and smoke. The premises has a timber workshop and storage areas on the ground floor, and offices on the first floor. An investigation found that the fire started accidentally. The fire alarm activated immediately.

(a) **Identify** possible sources of ignition that may have been present when the fire started in the workshop. **(10)**

(b) **Outline** possible reasons why the office workers on the first floor were slow to evacuate the building. **(10)**

6. **Outline** fire precautions that should be considered when carrying out hot work.

7. **Outline** how the improper use of electrical equipment can cause electricity to act as an ignition source. **(8)**

8. (a) **Outline** measures that can be taken to minimise the risk of fire from electrical equipment. **(6)**

(b) **Identify** suitable extinguishing agents that should be used on fires involving electricity. **(2)**

9. Contractors are to decorate a number of offices in a two-storey office block while the building remains occupied.

(a) **Outline** how this work could increase the likelihood of fire occurring. **(4)**

(b) **Outline** how this work could adversely affect fire protection measures. **(4)**

10. **Explain** why premises with poor security measures may be at a higher risk of an arson attack. **(8)**

11. **Outline** appropriate design features of a separate outdoor building that is to be used to store flammable liquids in large drums. **(8)**

## Element 4: Fire protection in buildings

### Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Outline the means of fire protection and prevention of fire and smoke spread within buildings in relation to building construction and design
- Explain the requirements of a means of escape
- Outline the methods and systems available to give early warning in case of fire, both for life safety and property protection
- Outline the selection procedures for basic fire extinguishing methods for both life risk and process risk
- Explain the requirements for ensuring access for the fire service is provided and maintained
- Outline steps to minimise the environmental impact of fire and firefighting operations.

### Content

#### 4.1 The means of fire protection and prevention of fire and smoke spread within buildings in relation to building construction and design

- The role of the Building Regulations 2010
- Elements of structure according to the Building Regulations 'Approved Document B'
- Properties and requirements for fire resistance for elements of structure; resistance to collapse, fire and smoke penetration and transfer of excessive heat, resistance of fire doors and glazing; the significance of any immediately visible damage and the need to repair it
- Compartmentation to inhibit spread of fire and smoke within buildings, protection of openings in compartment walls and floors and fire stopping, cavity barriers, penetration seals, fire resisting ductwork
- Fire-resisting dampers (mechanical or intumescent)
- Internal fire growth, wall lining materials (including over-painting), fixtures, fittings and contents
- Fire-resisting walls, floors and ceilings forming escape routes and the need to maintain fire resistance
- Alarm systems linked to forced ventilation systems (automatic shutdown of ventilation system on activation of the fire alarm) - also see Element 3.2
- Means of preventing external fire spread:
  - construction of external walls and roofs
  - distance between buildings
  - use/activities undertaken at premises
  - surrounding premises
  - the role of the external walls in protecting escape routes at the boundaries.

#### 4.2 Means of escape

- Understanding of a means of escape
- Principles, features and general requirements of means of escape:

- alternative escape routes
- understanding that all persons within the premises should be able to reach a place of ultimate safety before life-threatening conditions arise; either unaided or with the assistance of staff but without Fire Rescue Service (FRS) assistance (required safe egress time (RSET) versus available safe egress time (ASET))
- maximum travel distances
- number and size of escape route for number of occupants, (and basic occupancy calculations for offices and places of work and public assembly)
- requirements for escape stairs, passageways and doors
- use of door releases and other escape devices (including the need for these to fail safe)
- protection of escape routes
- emergency escape lighting (EEL) - common forms, modes of operation and signage; siting of luminaires and "Points of Emphasis"; limitations of emergency generators
- design for progressive horizontal evacuation
- final exit to a place of safety, etc.
- Management actions to maintain means of escape
- Requirements for means of escape for vulnerable people and people with disabilities and/or mobility problems:
  - use of evacuation lifts and refuges
  - visual (including graphic), aural and tactile way-finding and exit sign systems
  - personal emergency evacuation plan (PEEP).

#### **4.3 The methods and systems available to give early warning in case of fire, both for life safety and property protection**

- Fire alarm and fire detection systems
- Types of automatic fire detection, their limitations and links with other systems and equipment e.g., fire doors and fire extinguishing systems
- Categories of fire alarm and detection systems and their objectives (BS 5839, Part 1 and Part 6)
- Fire alarm zoning, the need for zone plans and their value to the FRS
- Alarm signalling, common alarm devices and their limitations
- Emergency Voice Communication (EVC) Systems
- Use of alarm receiving centres
- Manual and automatic systems
- Factors to be considered in the selection of fire detection and fire alarm systems :
  - life risk
  - process risk
  - behavioural issues
  - social behaviour and minimising false alarms
  - requirements for vulnerable people and people with disabilities and/or mobility problems
- Requirements for certification, maintenance and testing of fire detection and alarm systems.

#### **4.4 Selection procedures for basic fire extinguishing methods for both life risk and process risk**

- Factors in the provision, design and application of portable fire-fighting equipment and fixed installations

- relevance of classification of fires when choosing fire-fighting equipment
- Extinguishing media
  - water
  - foam
  - dry powder
  - vapourising liquids
  - gaseous
  - and mode of action, advantages and limitations
- Portable fire-fighting equipment: siting, maintenance and training requirements
- Fixed installations (such as sprinkler, gas flooding and drencher systems and hose reels).

#### **4.5 Requirements for ensuring access for the fire service is provided and maintained**

- Requirements for vehicle and building access, fire mains/water source and smoke/heat venting of basements
- Fire-fighting shafts and stairwells
- Liaison with fire authority on arrival; contents of building.

#### **4.6 Steps to minimise the environmental impact of fire and fire-fighting operations**

- Sources of pollution in the event of a fire; toxic and corrosive smoke, run-off of contaminated fire-fighting water
- Legal obligations related to environmental protection in the event of a fire, role of the Environment Agency and in the event of a fire, Water Resources Act 1991
- Factors to be considered in pre-planning the minimisation of environmental impact of fire
- Site and damaged area clean up consideration.

#### **Example exam style questions**

1. A science department building is to be built on a college campus. The building is to be two storeys and will contain teaching laboratories, classrooms and offices. It is expected that there will be a number of disabled staff and students using the building.

**Outline** functions of the component parts of a fire alarm system that are needed to provide protection for the building's occupants. **(8)**

2. Carbon dioxide (CO<sub>2</sub>) extinguishers have been installed in new office premises.

(a) **Outline** the types of fire that these extinguishers can safely extinguish. **(2)**

(b) **Outline** advantages of this type of extinguisher. **(2)**

(c) **Outline** disadvantages of this type of extinguisher. **(4)**

3. (a) **Identify** products of a fire that can be detected by an automatic fire detection system. **(4)**

(b) **Outline** ways of reducing false alarms from automatic fire detection systems. **(4)**

4. (a) **Identify** pathways by which pollutants from the site of a fire can enter the water ecosystem. **(3)**

(b) **Identify** methods that can be used to contain fire-fighting water run-off produced at the site of a fire

**5. Identify FOUR** component parts of a fire alarm system **AND outline** the function of **EACH**. (8)

6. a) **Outline** how suitable wall lining materials could help minimise the risk from fire. (3)

(b) **Identify** types of wall lining material that could be used on a means of escape. (5)

(c) **Outline** how compartmentation in a building may be compromised. (5)

(d) **Describe** how a fire may spread to a neighbouring building. (3)

(e) **Outline** means of preventing a fire from spreading to a neighbouring building.

7. Following refurbishment work in a multi-storey factory, it has been discovered that holes drilled into fire-resisting walls to allow cables through have not been fire-stopped.

(a) **Outline** adverse effects that this situation may have on fire protection within the building. (3)

(b) **Outline** other ways that the protection offered by compartmentation in the building may have been compromised. (5)

**8. Outline** why a fire-resisting door may fail to provide adequate protection in the event of a fire. (8)

# Element 5: Safety of people in the event of fire

## Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Explain the purpose and requirements of a fire emergency plan
- Describe the development and maintenance of a fire evacuation procedure
- Outline the perception and behaviour of people in the event of a fire
- Outline appropriate training requirements.

## Content

### 5.1 Fire emergency plan

- Purpose:
  - ensure people on premises know what to do in the event of fire
  - ensure appropriate action is taken in the event of fire to enable the premises to be evacuated safely
- Content of a fire emergency plan to include issues such as:
  - how people will be warned
  - action people should take on discovering a fire
  - action people should take in the event of a fire
  - arrangements for calling the Fire and Rescue Service
  - isolations
  - fire alarm activities
  - evacuation procedure
  - assembly points
  - fire-fighting arrangements
  - procedures for meeting the Fire and Rescue Service on arrival (including access arrangements)
  - provision of information on incident, etc
  - vulnerable people and those with disabilities
- Multi-occupied premises (need to consult/compile with all occupiers)
- Compatibility of the emergency plan with the everyday use of the premises.

### 5.2 The development and maintenance of a fire evacuation procedure

- The purposes of, and essential requirements for, evacuation procedures and drills,
- alarm evacuation and roll call
- Procedures to evacuate vulnerable people and people with disabilities and/or mobility problems
- Types of evacuation procedures (staged, phased, horizontal, etc.) and interaction with staged alarm systems
- Actions required when evacuating members of the public
- Maintenance of a fire evacuation procedure.

### 5.3 Perception and behaviour of people in the event of a fire

- Principles of sensory perception:

- early recognition by the senses
- recognition of fire threat
- perception versus reality
- response to different forms of audible and visual warnings including negative aspects of warnings, recognition of alarms and reaction problems of people with sensory impairment, etc.
- The effect of time pressure and stress on the decision making process during fire emergencies:
  - difficulties of spatial orientation and way-finding in large and complex locations;
  - patterns of exit choice in fire emergencies
  - the implications of exit choice behaviour in designing for fire safety
- Likely behaviour of individuals responsible for others during a fire; (such as parents and elder siblings, nurses, teachers, etc.)
- The effect of different behaviours on fire and evacuation
- Crowd movement (individuals and in groups); how crowd flow can cause danger and prohibit safe escape, modification of crowd flow by physical design and messages
- Measures to overcome behavioural problems:
  - clear roles and responsibilities
  - clear alarms
  - well practiced drills
  - clear escape routes
  - measures to assist vulnerable people and people with disabilities and/or mobility problems
  - include contingency to deal with sleeping people within the evacuation strategy.

#### 5.4 Appropriate training requirements

- Fire safety training information for employees, temporary, agency staff and volunteers, etc.
- Training, experience, knowledge, other qualities and available equipment for competent persons
- Role of fire marshals/wardens in an emergency
- Employees with management/supervisory roles (may include; fire safety plan, fire alarm control panel, knowledge of special evacuation arrangements for persons with disabilities).

#### Example exam style questions

1. **Outline** reasons for conducting fire drills in a workplace. **(8)**
2. (a) **Identify** categories of persons who may need particular assistance in order to reach a place of safety in the event of a fire in a workplace. **(3)**
  - (b) **Outline** ways that could be adopted to assist vulnerable persons to reach a place of safety in the event of a fire. **(5)**
3. **Outline** the content of a fire training course for fire marshals in an organisation. **(8)**
4. **Outline** the content of a fire emergency plan. **(8)**
5. **Outline** why a person may be slow to evacuate a building when the fire alarm has been activated.



**6. Outline** the following types of evacuation procedure:

(a) phased; **(3)**                      (b) horizontal; **(3)**            (c) single-stage. **(2)**

7. The premises of a large manufacturing organisation has been damaged by fire and smoke. The premises has a timber workshop and storage areas on the ground floor, and offices on the first floor. An investigation found that the fire started accidentally. The fire alarm activated immediately.

(a) **Identify** possible sources of ignition that may have been present when the fire started in the workshop. **(10)**

(b) **Outline** possible reasons why the office workers on the first floor were slow to evacuate the building. **(10)**

**8. Outline** what should be considered when developing an evacuation procedure for a shared-occupancy office building. **(8)**

9. During a shop fire, the evacuation of personnel was delayed. The fire risk assessment was reviewed and an absence of fire drills was identified. **Outline** reasons for conducting fire drills in a workplace.

## Element 6: Fire safety risk assessment

### Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations. In particular they should be able to:

- Explain the aims and objectives of fire safety risk assessments
- Outline the principles and practice of fire safety risk assessments including principles of prevention (measures to remove and reduce risk)
- Outline matters to be considered in a risk assessment of dangerous substances
- Outline measures to be taken to control risk in respect of dangerous substances.

### Content

#### 6.1 Aims and objectives of fire safety risk assessments

- Meaning of hazard and risk in relation to a fire
- Criteria for a 'suitable and sufficient risk assessment'
- Objectives of fire safety risk assessments: outcomes of incidents in terms of human harm, legal and economic effects on the organisation and impact on overall risk magnitude; safety measures and management policies necessary to reduce the risk to persons from fire
- Distinction between different types of fire incident:
  - injury accident,
  - ill-health,
  - dangerous occurrence,
  - near miss
  - fire damage-only

#### 6.2 Principles and practice of fire safety risk assessments

- Identification of laws, regulations and guidance to be considered
- Fire hazards:
  - sources of ignition
  - sources of fuel
  - sources of oxygen including oxidising agents
- Methods of identifying hazards such as inspections, job/task analysis, etc.
- People at risk such as:
  - employees
  - maintenance staff
  - cleaners
  - contractors
  - visitors
  - public
  - young persons (reference to schedule 1 Part 2 of the Regulatory Reform (Fire Safety ) Order 2005
  - vulnerable people and people with disabilities and/or mobility problems, etc
- Evaluation of risk and the adequacy of existing fire safety measures

- Evaluate the likelihood that a fire may occur (i.e., the risk of ignition sources, oxygen and fuel coming together) by either an accidental event, by an act or omission or by deliberate intent
- Evaluate the hazards to people in the event of fire, i.e. loss of visibility, elevated temperature, toxic gases and oxygen depletion
- Evaluate the consequence to people from a fire starting in the building (i.e., potential for a fire to cause death or injury) such as the need to consider available escape routes in relation to location where fire may start, potential fire and smoke spread due to level of protection, etc.
- Risk to be reduced as far as is reasonably practicable
- Avoid or reduce hazards that may cause a fire
- Put in place fire safety measures to reduce the risk to persons from fire (such as means of detecting fires, means of escape, means of fighting fires, arrangements for action to be taken in event of fire, etc.)
- Principles of prevention;
  - avoid risk
  - evaluate risk that cannot be avoided
  - combat risk at source
  - adapt to technical progress
  - replace the dangerous by the non-dangerous or less dangerous
  - develop a coherent overall prevention policy that covers technology, organisation of work and the influence of factors relating to the working environment, collective fire safety protective measures priority over individual protective measures; instruction to employees
- Recording significant findings: Format, information to be recorded such as:
  - significant fire hazards
  - persons at risk
  - actions taken to reduce risk to persons
  - fire preventive measures
  - details of emergency plan
  - information
  - instruction
  - and training requirements
- Reviewing the fire risk assessment, reasons for review such as:
  - a change in the number of persons present or persons with disabilities,
  - any alterations to the building
  - changes to work procedures
  - introduction of new equipment
  - significant changes to furniture and fittings
  - introduction of or storage of dangerous substances
  - becoming aware of shortcomings in fire safety measures or improvements, legislative changes
  - elapse of time
- Sources of information that could be consulted reference to Element 1 'Managing fire safety' and information such as:
  - legislation
  - Communities and Local Government practical fire safety guidance or alternatively related local guidance, Social Services and Public Safety guidance documents
  - fire plan
  - old fire certificate (if available)
  - previous risk assessments
  - general monitoring records
  - portable appliance tests (PAT) records/electrical checks – installations, etc.,

- fire log book
- previous incidents
- visitor register
- current fire precaution checks (fire alarm systems, emergency lighting, fire signs, portable firefighting equipment, etc.)
- training and maintenance records
- health and safety file
- operator and machine manuals, etc.

### **6.3 Matters to be considered in a risk assessment of dangerous substances**

- Reference to Element 3 'Causes and prevention of fires' and Schedule 1 Part 1 of the Regulatory Reform (Fire Safety) Order 2005. Regulation 5 of the Dangerous Substances and Explosive Atmosphere Regulations 2002, and can include:
  - the hazardous properties of the substance
  - information on safety provided by the supplier
  - the circumstances of the work (special/technical/organisational measures, the substance and possible interactions, amount of substance, risk presented by combination of substances)
  - arrangements for safe handling
  - the likelihood that an explosive atmosphere will occur
  - the likelihood that ignition sources will be present and become active and effective
  - the scale of the anticipated effects
  - any places which are, or can be connected via openings, to places in which explosive atmospheres may occur
  - any additional information which may be needed to completed the assessment.

### **6.4 Measures to be taken to control risk in respect of dangerous substances**

- Reference to Element 3 'Causes and prevention of fires' and Schedule 1 Part 4 of the Regulatory Reform (Fire Safety) Order 2005 Regulation 5 of the Dangerous Substances and Explosive Atmosphere Regulations 2002, and can include:
  - reduce quantities to a minimum
  - avoid/minimise the release of a dangerous substance
  - control the release of a dangerous substance at source
  - prevent the formation of an explosive atmosphere (including appropriate ventilation)
  - ensure that any release of a dangerous substance which may give rise to risk is suitably collected, safely contained, removed to a safe place, or otherwise rendered safe, as appropriate
  - avoid ignition sources and electrostatic discharges
  - segregate incompatible dangerous substances
  - reduce number of persons exposed to a minimum
  - provide and maintain fire suppression equipment
  - provide and maintain explosion pressure relief arrangements
  - measures to avoid propagation of fires/explosions
  - ensure premises are designed, constructed and maintained so as to reduce risk
  - any hazardous jobs involving dangerous substances are carried out under an appropriate system of work including permit-to-work.

## Example exam style questions

1. **Explain** why a fire risk assessment should be carried out in a workplace. **(8)**
2. **Outline** what should be considered when carrying out a risk assessment of dangerous substances. **(8)**
3. Refurbishment work is to be carried out on an existing building. **Outline** what should be considered in a revised fire risk assessment while the work is being carried out. **(8)**
4. A fire risk assessment is being conducted on a work process that involves dangerous substances. It has been determined that it is not possible to avoid the use of the substances or to reduce the quantities involved in the process. **Outline** measures that should be considered to help reduce the fire risk from the dangerous substances. **(8)**
5. As part of the process involved in evaluating the level of fire risk in a workplace it is necessary to evaluate the consequence to people from a fire. **Outline** factors that should be considered while evaluating the consequence to people when carrying out a workplace risk assessment. **(8)**
6. **Outline** the principles of prevention that must be applied when considering fire safety measures to help ensure the safety of people and premises from the effects of fire. **(8)**
7. A fire risk assessment of a school's textiles classroom has identified that small quantities of flammable liquids such as paints, varnishes and adhesives are being used.
  - (a) **Give** the meaning of the term 'flashpoint'. **(2)**
  - (b) **Give** the meaning of the term 'auto-ignition temperature'. **(2)**
  - © **Outline** practical measures that should be considered in order to help reduce the risk from the storage of the flammable liquids. **(10)**
  - (d) **Identify** ways in which the occupants of the school could be at risk of harm from fire. **(6)**
8. **Outline** criteria that an enforcement officer would use when determining whether a fire risk assessment is 'suitable and sufficient'. **(8)**
9. **Outline** reasons for reviewing fire risk assessments. **(8)**