

# IFE Level 3 Diploma in Fire Science and Fire Safety

## Unit 2 – Fire Safety (Zone 1)

### Examiner Report – March 2020

#### Introduction

41% of the candidates that sat the examination achieved a Pass. The majority of candidates who passed achieved a D Grade. However, 16 candidates achieved either a B Grade or a C Grade.

Candidates generally performed best on questions 4 and 6; questions 3 and 7 were also answered well. Candidates performed least well on question 2.

It was common for candidates to provide good responses to one or two questions but to provide weaker responses to the other questions. It often appeared that candidates were more familiar with some topics than with others.

Responses often lacked sufficient detail and/or precision to score marks and many candidates presented responses as brief lists. Candidates sometimes failed to address all aspects of the question which again limited the marks that could be awarded.

#### Question 1

a) *In terms of fire testing, define:*

- i) *stability (1 mark)*
- ii) *integrity (1 mark)*
- iii) *insulation (2 marks)*

b) *State the main functions of a fire door. (4 marks)*

c) *State six features of a fire door. (6 marks)*

d) *Describe the testing process for determining the fire resistance of a timber fire door. (6 marks)*

#### **Examiner Feedback**

This was a popular option and candidates often scored their highest mark for their response to this question. Parts b) and c) were particularly well answered and candidates generally secured most of their marks for this question on these two parts.

In responding to part a), some candidates provided responses that were not sufficiently precise to secure marks. “Integrity” was often poorly defined and candidates often provided insufficient information to secure both of the marks available for the definition of “insulation”. Points which would have secured marks were as follows:

- Stability is the ability of a material to withstand the force to deform and collapse
- Integrity is the ability of a material to withstand fire exposure on one side without the transmission of fire as a result of the passage of flames or hot gases.
- Insulation is the ability of a material to withstand fire exposure on one side without the transmission of fire to the unexposed side by limiting heat transfer due to convection, conduction and radiation

Part b) was usually answered well with most candidates able to achieve either all, or a high proportion, of the marks available.

Some candidates provided lists of points in response to part c) and/or failed to focus on the specific requirements of fire doors. Single-word answers and/or imprecise statements did not score marks. For example, it was common for candidates to present only the single word “hinges”. This did not score marks; however, candidates who referred to “three hinges” or who explained the requirements for fire resistance in relation to hinges did score marks.

Part d) was usually answered poorly as candidates were unfamiliar with the detail of the process.

## **Question 2**

- a) *State the function of a column in a building and state the type of loads that columns are designed to carry. (2 marks)*
- b) *Describe how the following materials behave in fire and explain how this affects the fire protection required:*
- i) reinforced concrete (4 marks)*
  - ii) timber (4 marks)*
  - iii) steel (4 marks)*
- c) *Explain why steel is used to reinforce concrete. (6 marks)*

## **Examiner Feedback**

This question was a popular option for candidates but few candidates scored high marks for their responses.

In responding to part a), most candidates were able to explain the purpose of a column. However, many failed to answer the second part of the question which asked candidates to state the type of loads that columns are designed to carry; those candidates that identified vertical loads in their responses were able to secure both of the marks available.

As with part a), candidates often answered only half of the question post by part b); most candidates were able to describe how the different materials behave in fire but few went on to explain what this meant for the protection required. For example, in relation to steel, candidates were often able to describe the potential for steel to buckle/collapse but few went on to give points such as: the thicker and heavier the steel, the longer it takes to heat up, there is a need to protect steel from heat to limit loss of strength and thereby prevent collapse, there is a need to use methods such as protective intumescent coatings/boards, thinner sections needs more protection as more they are more vulnerable etc

There were six marks available for part c) so six points were required to secure full marks. Unfortunately, most responses were brief and few points were provided. Points that would have secured marks include:

- The expansion rates of steel and concrete are almost the same
- They share a similar coefficient of thermal expansion
- This eliminates any large internal stresses due to differences in expansion and contraction rates.
- The adhesion between the steel and concrete in contact results in efficient bonding of the two materials.
- Concrete provides good fire resistance and protects the steel
- The greater the amount of concrete over the steel, the longer it can maintain its fire resistance

### **Question 3**

a) *Describe the operation principles of each of the following types of detectors and state the types of fires they are best suited to detecting:*

- i) *ionising detector (4 marks)*
- ii) *optical (photoelectric) detector (4 marks)*

b) *Describe the difference between a smoke detector and a smoke alarm. (4 marks)*

c) *Describe the operating principles of a smoke and heat exhaust ventilation system and explain how these types of systems aid escape from a large modern building during fire conditions. (8 marks)*

### **Examiner Feedback**

Part a) was often answered well with many candidates demonstrating a good understanding of ionising detectors; however, some candidates appeared to be less familiar with optical detectors and appeared to guess at the answer. Some candidates supported their responses with diagrams. Diagrams were not required and did not secure marks in themselves; however, where the content of the diagram demonstrated relevant understanding, marks were awarded.

Candidates sometimes confused smoke detectors and smoke alarms when responding to part b). Candidates should be aware that:

- A smoke alarm is an all-in-one, self-contained device,
- with a detector, which senses the products of combustion (smoke) and sounds an audible, and sometimes visual, warning or alarm.
- A smoke detector is strictly a sensing device only,
- which senses the products of combustion (smoke) and sends a signal to a building's fire alarm system to activate an audible, and sometimes visual, warning or alarm.
- Smoke detectors must be connected to a building's fire alarm system and are not a stand-alone unit.

Candidates sometimes provided only brief responses to part c). There were eight marks available for this question so candidates who provided only a few brief points were unable to take advantage of the high marks available. Many candidates appeared to lack detailed understanding of smoke and heat exhaust ventilation systems.

#### **Question 4**

*You have been asked to provide fire safety advice at a large-scale construction site.*

- a) *Outline the issues that should be covered in the fire safety plan for the site. (10 marks)*
- b) *State the responsibilities of the site Fire Safety Co-ordinator. (10 marks)*

#### **Examiner Feedback**

This was a popular option for candidates and many candidates scored high marks. Part a) was usually answered particularly well with candidates often scoring more marks for this part of the question.

In responding to part b), candidates sometimes failed to appreciate the role of a fire safety coordinator and some provided irrelevant information about health and safety in general.

Some candidates answered the question by providing only brief lists. The lack of detail limited the marks that could be awarded as the candidate's intentions were not always clear enough for examiners to award marks.

#### **Question 5**

*You have been asked to advise a large organisation on the development of a fire safety training programme for use across the whole organisation. Describe the issues that should be included in the programme. (20 marks)*

#### **Examiner Feedback**

Candidates often listed points without expanding them which meant that opportunities for additional marks were lost.

There were 20 marks available but some candidates provided only brief responses.

#### **Question 6**

- a) *You have been asked to draw up a plan to reduce both the potential for, and the consequences of, an arson attack in a local school. Outline the main areas your plan would target. (15 marks)*
- b) *Describe five motivations that might lead to the deliberate setting of a fire. (5 marks)*

#### **Examiner Feedback**

This question appeared to be a familiar topic candidate and many provided well thought out and comprehensive responses.

As with other questions, some candidates provided only brief responses where high marks were available.

### **Question 7**

- a) *Describe the information that would be included in a typical emergency plan for a residential care premises.* (15 marks)
- b) *Staff expected to undertake the role of fire marshals (fire wardens) will require more comprehensive training than other members of staff. State five areas where additional training will be required.* (5 marks)

### **Examiner Feedback**

Part a) was often answered well although some candidates failed to consider the specific context in sufficient detail to secure high marks.

Part b) was less well answered as candidates often appeared unfamiliar with the role of a fire marshal (fire warden). Some simply repeated points made in their response to part a).

Examples of points that would have secured marks were as follows:

- detailed knowledge of the fire safety strategy of the premises
- awareness of human behaviour in fires
- how to encourage others to use the most appropriate escape route
- how to search safely and recognise areas that are unsafe to enter
- the difficulties that some people, particularly if disabled, may have in escaping and any
- special evacuation arrangements that have been pre-planned
- additional training in the use of firefighting equipment
- an understanding of the purpose of any fixed firefighting equipment such as sprinklers or gas flooding systems
- reporting of faults, incidents and 'near misses'

### **Question 8**

- a) *Describe the purpose of deluge systems.* (3 marks)
- b) *Describe the design and method of operation of three types of sprinkler head.* (9 marks)
- c) *State the design principles of a recycling sprinkler system.* (2 marks)
- d) *Sprinkler life safety systems need to be more reliable than basic systems. Describe the requirements of a life safety system which will enhance their reliability.* (6 marks)

### **Examiner Feedback**

In responding to part a), most candidates appeared to be familiar with deluge systems. However, marks were sometimes missed due to lack of detail in answers. Points that were needed to secure full marks were:

- deluge systems are designed for special hazards fires
- where intense fires with a very fast rate of fire propagation is expected to occur
- where it is desirable to apply water simultaneously over the complete zone in which fire may originate.

Part b) was usually answered well. Description of the following types of sprinkler heads scored marks:

- Conventional pattern or Spherical
- Spray pattern or Hemispherical
- Ceiling or flush pattern
- Recessed and concealed pattern
- Sidewall pattern
- Pendant
- Upright

Unfortunately, many candidates provided only a list of the sprinkler heads and failed to describe the required description; this meant that they achieved only the marks available for identifying the types of heads and failed to secure the marks available for descriptions.

Part c) was usually answered well.

When responding to part d), few candidates were sufficiently familiar with life safety systems to score more than one or two marks for this part of the question. Points which would have scored marks included:

- the system should be of a wet type
- the system should be zoned, each zone being controlled by a separate stop valve and having a maximum of 200 heads
- a zone may require the installation control valve-set to be duplicated so that one set of valves can be serviced whilst the system is operational
- no zone shall extend to an area of the building under separate ownership
- no zone shall extend to more than one floor level but a zone may include a mezzanine floor of not more than 100m<sup>2</sup>
- stop valves shall be accessible at the floor level of the zone they control
- only one zone of a multi-zone installation shall be shut down at any one time. The fire authority is to be advised of the intention and should have to approve
- all stop valves and tamper-proof electrical switches indicating that the valves are in the correct operating mode shall monitor alarm valves
- all practical steps shall be taken to ensure continuity and reliability of water supplies

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