IFE Level 3 Diploma in Fire Science and Fire Safety

Unit 2 – Fire Safety (Zone 2)

Examiner Report – March 2020

Introduction

36% of the candidates that sat the examination achieved a Pass. The majority of candidates who passed achieved a D Grade.

Candidates generally performed best on questions 5 and 8. They performed least well on question 1.

Many candidates appeared to be unprepared and some appeared to either guess at answers or to rely on experience gained via operational firefighting. Responses often lacked sufficient detail and/or precision to score marks. Candidates sometimes failed to address all aspects of the question when presenting their responses and this limited the marks that could be awarded.

Question 1

a) Describe the physical effects on a simple beam when a load is applied to it and explain what is meant by the term "neutral axis" or "neutral plane". (4 marks)

b)

i) Explain what is meant by the term "bending moment of a beam". (1 mark)

ii) Describe the physical effect of the bending moment and state the practical application of this bending moment. (4 marks)

c)

i) Explain why a concrete beam should be reinforced. (2 marks)
ii) Explain why steel is used as the reinforcing material. (8 marks)
iii) Explain how the thickness of the concrete affects the reinforcing steel. (1 mark)

Examiner Feedback

This question was often answered poorly with few candidates providing sufficient detail or precision in their responses to secure marks.

Part a) was often answered only partially answered. Candidates tended to guess at the first part of the question and often omitted to attempt the explanation. Full responses would have covered the following:

- When a beam is loaded, it deflects or bends
- Deflection causes the top of the beam to shorten so that the top is in compression.
- The bottom of the beam lengthens and thus is in tension.

- The neutral axis or neutral plane is the line along which the length of the beam does not change when a load is applied

Part b) also required specific precise information but again candidates provided only partially responses and often appeared to guess at answers.

Part c) required understanding of the use of concrete and steel and the particular factors influencing this. These materials are fundamental to building structures and fire resistance. Candidates often confused characteristics and terminology and this affected their reasoning in explaining why different approaches were taken. Candidates should be aware that concrete has relatively low tensile strength and ductility and that reinforced concrete can withstand high tensile stresses**.**

Question 2

a) State the locations where you would expect to find fire-resistant constructed walls and/or floors incorporated into the construction of a building. (5 marks)

b) Explain the purpose of fire stopping and state three situations where fire stopping would be required. (5 marks)

c) Describe the purpose and operation of open cavity barriers and state two situations where they would be used. (5 marks)

d) Describe the purpose and operation of smoke control systems and state two situations where smoke control systems should be provided. (5 marks)

Examiner Feedback

There were many good responses to this question with parts a) and d) often being answered particularly well.

Part a) was often answered well with many candidates able to secure full marks.

Part b) was less well answered with many candidates lacking understanding of this critical area of fire safety. Candidates should be aware that fire-stopping is used for sealing apertures and imperfections of fit, or design tolerance, between fire resisting walls, floors and ceilings to restrict the passage of fire and smoke. Fire-stopping products should have at least the same fire resistance as the elements into which they are installed. Examples of situations where fire stopping is required include:

- openings for pipes to pass through
- ducts carrying cables etc passing through compartmentation
- design imperfections between fire resisting walls/floors/ceilings
- timber framed housing junctions.

Candidates also appeared to be unfamiliar with open cavity barriers. Candidates should be aware that:

- cavity barriers are open to allow ventilation and drainage in the cold state
- but in a fire, the barriers close to provide fire separation in the cavity.

- the barriers are inherently fire resisting, usually made from stone wool slabs faced with aluminium foil
- an intumescent causes the seal to close in a fire.

Examples of the use of open cavity barriers include: rain screen cladding, roof ventilation, eaves within internal walls in buildings and areas where ventilation is required in the cold state e.g. electrical cable shafts.

Part d) was often answered well with many candidates able to secure all of the marks available for this part of the question.

Question 3

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 4

a) In the context of fire alarm signals, what is an "unwanted fire signal"? (3 marks)

b) What does the term "soak period" refer to in respect of fire alarm systems? (3 marks)

c)

i) What is a staged fire alarm? (2 marks)
ii) Describe four situations where a staged fire alarm would be appropriate. (12 marks)

Examiner Feedback

Parts a) and b) were often answered poorly with few candidates providing sufficient clarity or precision in their responses to secure marks. Candidates should be aware that an unwanted fire signal is a 'false positive' alarm raised by an automatic fire detection and fire alarm system; the alarms operate due to a mechanical or electrical fault, or a false activation caused by non-fire conditions (cooking fumes, dust, cigarette smoke etc.).

Part b) was an extension of part a) in that it explored the process to reduce unwanted fire alarms. The soak period is the period after a fire alarm system has been commissioned during which the system's performance in relation to false alarms and faults is monitored prior to handover**.**

Part c) was usually answered well as candidates seemed familiar with this aspect of fire safety.

Question 5

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 6

a) Outline the two main hazards normally associated with "dead ends". (2 marks)

b) Describe the measures that can be taken to reduce hazards and risks in "dead end" conditions. (15 marks)

c) Explain what is meant by the term "the 45-degree rule" in respect of means of escape from a room or storey exit. (3 marks)

Examiner Feedback

Part a) was usually answered well.

Responses to part b) were usually brief. Few candidates appeared to recognise that 15 marks were available and that therefore detailed responses were provided in order to take advantage of the marks. Candidates often provided very basic statements without expanding on them and many failed to appreciate that the question focused on *reducing* risks rather than dealing with them when they arose; some candidates suggest re-building the area completely but the question assumed that the conditions were in place so had to be addressed. Examples of measures that could have been covered include:

- keep the travel distance in a dead end as short as possible
- install smoke detection in the escape route
- provide occupiers in the dead-end with early warning of a developing fire situation
- doors to all habitable rooms in dead ends should be 30-minute fire resisting
- doors to be fitted with self-closing devices, vision panels and smoke seals.
- all glazing in dead end conditions to be fire resisting.
- doors to cupboards to be 30-minute fire resisting and fitted with smoke seals
- dead end corridors must be kept free from possible ignition sources,
- they must be kept clear of any obstructions.
- any high-risk activity or high-risk area must be removed from within a dead-end situation.

In responding to part c), most candidates demonstrated some understanding but few provided sufficient detail to secure all of the marks. Good responses explained that: for a second door from a room or storey exit to be considered as an alternative means of escape, the angle of separation between the two doors must be more than 45° unless the doors are separated by fire resisting construction.

Question 7

a) Outline the fire safety systems that should be incorporated in a compartment that utilises a CO_2 total flooding system to protect the equipment provided in that compartment. (10 marks)

b) Particular factors give rise to certain types of fire detectors being suitable or not suitable for installation in buildings. State one positive and one negative factor relevant to the use of each of the following types of detectors and systems:

i) optical detectors (2 marks)
ii) beam detectors (2 marks)
iii) ultra violet detectors (2 marks)

c) Explain why aspirating smoke detectors are useful in offering a suitable alternative to conventional fire detectors and provide an example of where the detector should be used. (4 marks)

Examiner Feedback

This question required good understanding of the range of detection systems available. Most candidates appeared to have understanding of only one or two systems.

When responding to part a), few candidates had sufficient detailed knowledge to score more than a few of the marks available.

In responding to part b), it was common for candidates have some understanding of optional and beam detectors but ultra violet detectors appeared to be less-well understood.

Part c) was often poorly answered or else omitted completely with few candidates demonstrating understanding of this type of detector.

Question 8

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.

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.

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