IFE Level 3 Diploma in Fire Safety and Fire Science

Unit 2 – Fire Safety

Examiner Report – March 2016

Introduction

Candidates performed less well than in previous years with only 24% of candidates achieving a Pass compared to 38% achieving a Pass in 2015.

The average mark achieved was below 8 marks for all questions. Candidates generally performed least well on questions 5, 6 and 7 and achieved their highest marks on questions 1, 8 and 9.

Many candidates provided only brief responses to questions and answers were often focussed on only a limited aspect of the question; for example, many candidates omitted one or more sub-sections of questions. Responses often included substantial repetition of points.

Question 1

In relation to CO_2 gas total flooding installations:

a) Identify four types of risks where this type of fixed installation may be suitable. (4 marks)

b) Explain two advantages of this type of system and two limitations. (4 marks)

c) Explain the safety systems incorporated into the operation of a total flooding system using CO_2. (6 marks)

d) Describe the three different systems available to apply the extinguishing medium. (6 marks)

Examiner Feedback

This was a popular choice of question and many candidates achieved a good mark.

Most candidates attained some marks for their response to part a) with most candidates correctly identifying examples such as computer systems, libraries/archives and electrical transformers.

Candidates who understood how these systems operate were able to identify advantages (non-conductor of electricity, little or no damage to equipment) and limitations (lack of cooling effect and need for enclosure to be fully sealed for effectiveness) in response to part b).

Candidates were usually able to identify one or more appropriate safety systems (eg unobstructed access to exit doorways, lighting and signage to the exit route, timed alarms to operate before the application and ventilation of the enclosure) in response to part c).

Part d) was generally answered poorly with few candidates identifying the three systems as total flooding system, local application and manual hose reel systems. Those candidates who correctly identified systems often failed to provide a full description as required by the question.

Question 2

a) *The function of fire detectors is to detect one or more changes in the protected environment indicating the development of a fire condition. Describe the conditions that should cause fire detectors to operate. (4 marks)*

b) *When designing a fire detection system for a building, the system selected should suit the needs of the building. Explain the four main factors the designer should take into consideration. (4 marks)*

c) *Particular factors give rise to certain types of fire detectors or systems being suitable or not suitable for installation in buildings. Outline the positive and negative factors relevant to the following types of detectors and systems:*
   i. *Heat detectors (3 marks)*
   ii. *Optical detectors (2 marks)*
   iii. *Beam detectors (2 marks)*
   iv. *Ultra violet detectors (2 marks)*
   v. *Aspirating detection systems (3 marks)*

Examiner Feedback

Candidates usually provided a good response to part a). However, some candidates outlined how a detector operates as opposed to identifying the "conditions" causing a fire detector to operate. Examples of correct responses include the invisible products of combustion and temperature reaching a pre-determined level.

Responses to part b) were less well developed and few candidates achieved a high mark for the response to this question. The question specified that the detection system should suit the needs of the building. However, many candidates repeated the question and wrote at length about the importance of the system suiting the needs of the building instead of focussing on the factors to consider to make sure it did suit the needs of the building. Factors that could have been identified included: the form of the evacuation strategy to be employed; the nature of the fire hazards; the speed of response needed (life or property safety); the need to minimise false alarms.

Candidates often provided good responses in relation to part c)i). However, understanding of other systems was less well developed and responses often omitted parts of the question. Aspiration detection systems were omitted from most responses.

Question 3

You have been asked to give advice about reducing the risk of arson to a school in your area.

a) *Identify five areas of research which you would undertake before giving that advice.(5 marks)*

b) *Describe the measures available to reduce the risk of arson. (15 marks)*

Examiner Feedback

Candidates who attained high marks clearly set out the actions that the school needed to take to reduce the risk of arson such as deterring entry to the site, establishing secure entry points to the building, establishing illumination of the risk during hours of darkness, securing flammable items when not in use, reducing the ease of access to flammable items (eg removing/re-positioning rubbish, skips etc).

Some candidates wrote at length about education programmes for pupils and the local community and failed to address the practical measures to reduce risk.

Question 4

a) Explain the following terms in relation to the use and mixing of concrete:

i. spalling
ii. curing
iii. aggregate
iv. casting
(8 marks)

b) Explain the two main ways concrete is reinforced with steel. (4 marks)

c) Explain how concrete will normally behave in a fire. (8 marks)

Examiner Feedback

Most candidates were able to define the terms set out in part a). However, many candidates provided only superficial descriptions; as they did not "explain" the terms as required by the question, they attained only half of the marks available.

Many candidates failed to demonstrate an understanding of post-tensioning and pre-tensioning systems to reinforce concrete when responding to part b).

When responding to part c), candidates often focussed on the performance of the steel in reinforced concrete rather than on the performance of the concrete. The question specified the behaviour of "concrete" so candidates that focussed only on steel limited the marks that they could attain.

Question 5

a) Identify four factors that should be considered in a risk assessment approach to hazard and risk in a building of special architectural or historic interest. (4 marks)

b) Describe eight measures that should be considered in a risk assessment approach to hazard and risk in a building of special architectural or historic interest. (16 marks)

Examiner Feedback

Candidates did not perform well on this question and marks attained by candidates were usually low. Although the question was set in the context of a building of special architectural or historic interest, the principles involved largely applied to a building of any type.

The factors required in response to part a) were: the anticipated risk of a fire occurring; the anticipated severity of any fire; the ability of the structure to resist the spread of fire and smoke; any consequential danger to people in and around the building.

Some candidates responded to part b) as though they were responding to a question on pre-planning for an incident. However, the question required measures to guard against hazard and risks. Examples of the control measures that could have been cited in response to part b) were: the use of detection for early warning of a fire situation; the standard of the means of escape; the controls in place to inhibit the growth of a fire such as sprinklers; the adequacy of the building structure to resist the effects of fire; the degree of fire containment – compartmentalisation; the management processes in place in respect of staff training and fire routines to aid an efficient evacuation.

Question 6

a) Identify the factors which affect the stability of load-bearing walls during a fire situation. (5 marks)

b) Brick is often used in the construction of load-bearing walls. Identify and describe the two main types of brick construction used in load-bearing walls. (10 marks)

c) Both hollow and solid building blocks are used for construction of walls of all types. Explain the behaviour of each of these types in a fire. (5 marks)

Examiner Feedback

This question was one of the least well answered questions.

Part a) of this question relating to stability factors of load-bearing walls was well answered by most candidates. However, very few candidates were able to identify solid and cavity brickwork as the two main types of brick construction used in load-bearing walls in response to part b). Part c), relating to the fire performance of hollow and solid blocks in wall construction, was often completely omitted by candidates.

Question 7

a) What is an accommodation staircase? (2 marks)

b) What is a protected stairway? (2 marks)

c) Explain, with the use of a diagram, the principle of a stair by-pass. (6 marks)

d) When calculating staircase capacities for use in emergencies, explain the principle of discounting staircases. (2 marks)

e) Outline two exceptions that are permitted so as not to discount an escape staircase. (4 marks)

f) Describe four situations where an escape stairway will need additional protection in the form of either a lobby or protected corridor. (4 marks)

Examiner Feedback

This question was one of the least well answered questions.

An accommodation staircase is one that is additional to that required for escape purposes while a protected stairway is one that is enclosed in fire resisting construction discharging through a fire exit to a place of safety.

Many of the diagrams (and supporting text) presented in response to part b) failed to identify the critical aspects of the provision of a stair bypass ie fire resisting construction, self-closing fire doors and exit signage of the bypass route.

The concept of discounting stairways is fundamental to means of escape planning but was not fully understood by candidates. Where two or more stairs are provided, planning presumptions should assume that one of them might not be available due to a fire. Each staircase should be discounted in turn in order to ensure that the capacity of the remaining staircase/s is adequate for the numbers of persons needing to use the stairs to escape the building. Exceptions permitted to the discounting rules are where the stairways are protected by a smoke control system, where the stairways are approached on each storey level through a protected lobby and where a sprinkler system is fitted.

Situations where an escape stairway requires additional protection in the form of either a lobby or protected corridor are where the stair is the only one serving the building and where there is more than one storey above or below ground floor, where the stair serves any storey at a height over 18m, where the building is designed for phased evacuation and where the stair is a fire fighting stair.

Question 8

a) Outline the purpose and use of fire dampers within buildings. (4 marks)

b) Describe with the aid of a diagram the two types of fire dampers in common use. (12 marks)

c) Explain the inspection and maintenance considerations relevant to fire dampers.(4 marks)

Examiner Feedback

Candidates often failed to include in their response to part a) that the purpose of fire dampers is to maintain the integrity of the compartment.

In response to part b), most candidates were able to identify the two types of dampers in common use. However, the diagrams provided to support the descriptions of the two types of damper were often lacking in detail and therefore failed to identify the key elements that would have attracted marks. Few candidates identified that mechanical dampers can be used in conjunction with smoke detection or that intumescent dampers are used where air velocities are low.

Part c) was very poorly answered. The majority of candidates failed to relate the routine maintenance to build-ups of accumulated dust and dirt that could prevent or delay the operation of the damper.

Question 9

a) Describe the difference between maintained and non-maintained emergency escape lighting and state where you would typically find each type. (4 marks)

b) Identify six areas in a building where emergency lighting would typically be installed. (6 Marks)

c) Describe four occasions where the emergency lighting will be designed to remain illuminated for up to three hours. (4 marks)

d) Describe a typical testing regime for an emergency lighting system.(6 marks)

Examiner Feedback

Most candidates provided a good response to part a) and successfully identified areas where emergency lighting should be installed in response to part b).

Very few candidates understood where emergency lighting is required to remain illuminated for up to three hours. Examples of occasions where this is required included non-residential premises used for recreation such as cinemas and theatres, buildings higher than 10 storeys and premises used for sleeping accommodation such as hotels.

Part d) of the question was not answered well as candidates often failed to relate their response to timescales/regular testing regimes.

Question 10

a) You have been asked to review a risk assessment for a care home where previously only residents who were fully mobile were accommodated. The care home now wishes to accommodate residents who cannot self-evacuate. Describe the additional measures you would expect to find, or to recommend, to address this new risk. (16 marks)

b) Identify four other circumstances in which the responsible person for a premises should review the risk assessment. (4 marks)

Examiner Feedback

Many candidates failed to appreciate that the fundamental requirement of the question set in part a) was the “additional” measures required to address the risks associated with people who could not self-evacuate from a building where previously all persons could self-evacuate.

Some candidates simply outlined generic risk assessment issues rather than tailoring their response to the specific context.

Those candidates that attained good marks identified the following provisions: structural compartmentation to incorporate progressive horizontal evacuation; additional protection to individual rooms such as sprinklers or increased separation; upgrading of the fire detection system; linking of the fire warning system to a central control centre; changing the evacuation strategy to incorporate progressive horizontal evacuation; increasing staff numbers to support a revised evacuation strategy; enhancing staff training to incorporate new roles and new equipment; introducing new evacuation equipment such as evacuation chairs, mats etc.

Part b) was generally answered poorly. Examples of reasons to review the risk assessment include: the introduction of new equipment; changes of use to part of the building; alterations to the building including the internal layout; substantial changes to furniture and fixings; the introduction/change of use or increase in storage of hazardous substances; the failure of provided fire safety measures; a significant increase in numbers of persons present; the presence of people with some form of disability.