

**L3D2**



**THE INSTITUTION OF FIRE ENGINEERS**  
Founded 1918 • Incorporated 1924

**IFE Level 3 Diploma in Fire Science and Fire Safety (VRQ)**

**Unit 2: Fire Safety (F/505/6006)**

**Thursday 10 March 2016**

**10.30 – 13.30**

**Instructions to Candidates**

1. The time allowed for this examination is **THREE** hours.
2. Candidates should answer **SIX** questions from the total of **TEN** questions set for this examination.
3. All questions carry equal marks and may be answered in any order. Candidates should follow the instructions provided in the question when composing their answers.
4. Candidates should record all of their answers in the answer book provided.
5. The question paper must be handed in with the answer book.

### Question 1

In relation to CO<sub>2</sub> 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<sub>2</sub>. (6 marks)
  - d) Describe the three different systems available to apply the extinguishing medium. (6 marks)
- 

### 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)
-

### 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)
- 

### 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)
- 

### 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)
- 

**[Please turn over]**

### 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)
- 

### 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)
- 

### 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)
-

**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)
- 

**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)
-