

**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 16 March 2017**

**10.30 – 13.30**

**Instructions to Candidates**

1. The time allowed for this examination is **THREE** hours.
2. Candidates must answer **SIX** questions from the total of **EIGHT** 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

- a) Describe briefly what an 'atrium' is, as an architectural concept. (2 marks)
- b) Describe the hazards to persons from fire associated with this form of building design. (4 marks)
- c) Identify the four systems that can control or manage smoke from a possible fire situation in an atrium and briefly describe the features of each of the four systems. (14 marks)
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### Question 2

- a) Define what a 'column' is as a structural element of construction. (3 marks)
- b) Explain the main structural function of a column in a building. (3 marks)
- c) State four factors that affect the fire resistance of a concrete column. (4 marks)
- d) Define what a 'beam' is as a structural element of construction. (2 marks)
- e) A beam is subjected to a number of external and internal forces. Identify these internal and external forces. (4 marks)
- f) Concrete is very poor in terms of its tensile strength. Identify the material that can be used in conjunction with concrete to create beams to overcome this inherent weakness and explain why this material is used. (4 marks)
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### Question 3

- a) Describe the ways in which effective management of fire safety control measures contribute to the protection of building occupants. (12 marks)
- b) Give two examples of situations where it is appropriate to utilise visual alarm signals and explain why a visual alarm signal is appropriate in each case. (4 marks)
- c) Outline four fire safety disadvantages of manual fire warning systems. (4 marks)
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#### Question 4

Sandwich panels are a common building material used in building construction.

- a) Describe the structure of sandwich panels and explain from a fire safety perspective the problems associated with them. (5 marks)
  - b) State three elements of construction that sandwich panels might be used for and describe the core material used in each application (6 marks)
  - c) Define what is meant by the term 'hot work' and describe the circumstances when it is considered appropriate to adopt a hot work permit procedure. (4 marks)
  - d) State the critical information that a hot work permit should identify. (5 marks)
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#### Question 5

In most buildings the evacuation arrangements as a response to the fire alarm activation are designed around simultaneous evacuation.

- a) Identify and describe the three forms of evacuation arrangement other than simultaneous evacuation. For each particular type, provide an example of the type of building the arrangement will be suitable for. (17 marks)
  - b) The evacuation process can be broken into three parts that take place one after the other ie: Recognition time, Response time and Travel time. Define each of these terms. (3 marks)
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#### Question 6

- a) A sprinkler installation should be based on a system type. Identify five of the main types of automatic sprinkler system and outline the types of premises where these systems would typically be installed. (10 marks)
  - b) Identify three different 'superior' water supply options for a 'low rise' sprinkler system. (3 marks)
  - c) Explain the purposes and operation of an alarm valve fitted to a typical sprinkler system. (7 marks)
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**[Please turn over]**

### Question 7

- a) Explain how pressurisation is used to keep escape routes and firefighting access routes clear of smoke. (3 marks)
- b) Identify the three pressurisation system options that are available to building designers. (3 marks)
- c) Identify and explain the two basic design aspects that have to be considered by the designer when designing an effective pressurisation system for a stairway shaft. (10 marks)
- d) Describe the role of a pressurisation system designed for a stairway means of escape route. (4 marks)
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### Question 8

Effective management and planning is needed for those with impairments to ensure their safe evacuation from buildings in an emergency.

- a) Explain what is meant by a 'refuge' and describe the features that need to be included in the design of a suitable disabled refuge. (10 marks)
- b) Describe the features you might consider including when designing escape routes and systems to assist visually impaired people to evacuate a building. (6 marks)
- c) What is a Personal Emergency Evacuation Plan (PEEP) and what would a plan of this type normally include? (4 marks)
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