

L4C6



THE INSTITUTION OF FIRE ENGINEERS
Founded 1918 • Incorporated 1924

IFE Level 4 Certificate in Fire Science and Fire Safety (HL)

Unit 6: Fire Investigation (T/505/5936)

Friday 11 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 **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 responses.
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

Paper is a common fuel often encountered in compartment fires. Describe in detail the properties of paper and explain how paper behaves when involved in combustion.

(20 marks)

Question 2

You are called to investigate a fire involving an energised two gang extension lead with two electric heaters plugged into it. The extension lead is supplied by a ring main fitted with a 32A miniature circuit breaker. The nominal voltage is 230V AC. Information suggests that one heater has a 3kW element and the other has a 1kW element.

a) Assuming that the information is correct, calculate the current draw if both the heaters are in use (correct to 2 decimal places).

(4 marks)

b) Calculate what the expected resistance should be for each element (correct to 2 decimal places).

(4 marks)

c) Discuss the possibility of this fire being of electrical origin and give your reasoning.

(12 marks)

Question 3

A lot of evidence can be obtained from glass fragments recovered from a fire scene. Describe the information that can be recovered from examining the glass at a fire scene and explain how glass can be fractured.

(20 marks)

Question 4

a) Explain, in detail, *heat release rate*.

(10 marks)

b) The location of a fire within a compartment plays a key role in the development of the fire plume. Describe the effect that the *wall factor* has on plume development.

(10 marks)

Question 5

- a) Define the term 'fire'. (2 marks)
- b) Explain the different types of flame structures produced during combustion. (8 marks)
- c) Describe five differences between flaming combustion and smouldering/glowing combustion. (10 marks)
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Question 6

A compartment fire in a room with a normal fuel load goes through fairly predictable stages of development in its lifetime. With the aid of a simple diagram, describe in detail each of these stages. (20 marks)

Question 7

As the effects of the nature of fuels and the conditions in a wildland fire are fairly predictable, there are a number of reliable indicators that can be used to determine the direction of fire spread past a given point. Describe these indicators. (20 marks)

Question 8

Fire behaviour 'indicators' are the visible, and usually measurable, changes to the surfaces and materials within a fire scene produced by heat, smoke or flames.

- a) Explain what 'ghost marks' are and how they are produced. (10 marks)
- b) Describe the process that results in 'annealed furniture springs' and explain how annealed furniture springs can assist the fire investigator. (10 marks)
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