# L4C6

**THE INSTITUTION OF FIRE ENGINEERS**
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## IFE Level 4 Certificate in Fire Science and Fire Safety

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

**Friday 15 March 2019**

**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 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**

a) Interviews with witnesses form an important part of any fire investigation. State and explain four factors that can affect the quality of evidence provided by lay witnesses.

(4 marks)

b) The witness testimony of first responders will contain information not available from anyone else. State six questions that can be asked of first responders and explain why the information is valuable to the investigator.

(12 marks)

c) Explain what is meant by the Cognitive Interviewing method.

(4 marks)

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**Question 2**

a) Glass is a material that is commonly used in the built environment. Describe the evidence that would indicate that normal window glass (i.e. not reinforced or toughened) has been broken by:

i) impact

(8 marks)

ii) non-uniform heating

(8 marks)

b) Toughened glass breaks in a different way to normal glass. Describe the limitations related to toughened glass when trying to determine how it was broken.

(4 marks)

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**Question 3**

a) Discuss the likelihood of a motor vehicle's fuel tank, containing petrol/gasoline, exploding when involved in a fire.

(17 marks)

b) Some vehicles are being fitted with Liquefied Petroleum gas fuel systems. Describe the main fire risks relating to these systems.

(3 marks)

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**Question 4**

A number of indicators that have been traditionally linked to fires involving ignitable liquids have been shown to be unreliable. Identify ten of these indicators and explain in detail the facts relating to how they can be unreliable as an indicator of fire involving a flammable liquid.

(20 Marks)

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**Question 5**

a) Hot objects and surfaces provide a viable source of ignition. However, it is not a simple matter of noting the temperature of the surface or mass and comparing it to the fuel's auto-ignition temperature. Detail the factors that influence a fuel's ability to be ignited by a hot surface or object.

(6 marks)

b) Static electricity is also a viable ignition source. Discuss in detail the phenomenon of static electricity and its ability to initiate fires.

(14 marks)

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**Question 6**

With regards to explosions, describe in detail the difference between a detonation and a deflagration. Explain in your answer the mechanism and effects that can be expected from each.

(20 marks)

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**Question 7**

a) 'Entrainment effects' occur when a fire draws in cooler air from its surroundings. A special case of this phenomenon is called the 'trench effect'. Describe in detail this phenomenon.

(15 marks).

b) Entrainment also affects plume development. Describe the effect entrainment has on a fire's plume if the fire is located against a non-combustible wall.

(5 marks)

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**Question 8**

Wood is a common fuel burned in structural and outdoor fires. Thus, its properties as a fuel regarding its behaviour during a fire must be understood by the fire investigator. Discuss in detail these properties and how they relate to ignition and combustion.

(20 marks)

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