L4C2

THE INSTITUTION OF FIRE ENGINEERS

Founded 1918 • Incorporated 1924

IFE Level 4 Certificate in Fire Science and Fire Safety

Unit 2: Fire Safety (D/505/5932)

Friday 13 March 2020

14:30 – 17:30

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.

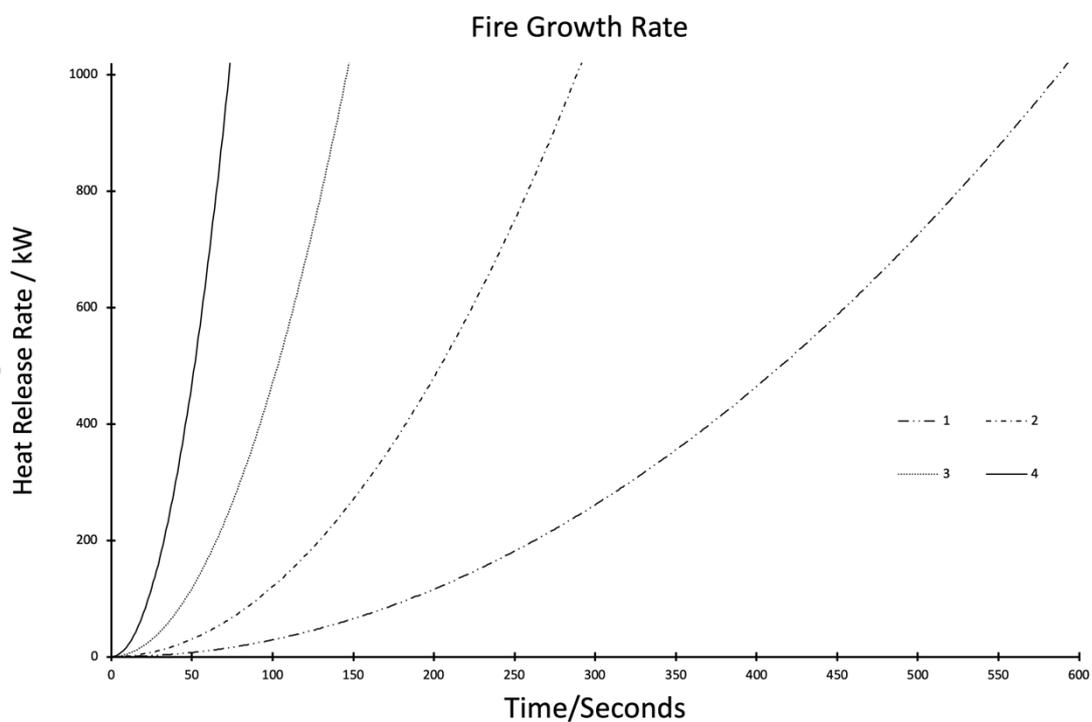5. The question paper must be handed in with the answer book.

Question 1

The t^2 equation shown below is a comparatively simple model for expressing different fire growth rates from different materials.

$$\dot{Q} = \alpha \times t^2$$

Where:
$\dot{Q}$ = Heat Release Rate   kW
α = Fire Growth Parameter   kW/s^2
t^2 = Time squared   seconds

Fire Growth Rate

a) Referring to the graph above and using the table provided as a separate answer sheet in this examination paper, complete the table to show for each curve the growth rate name, the time to 1 MW and an example of the type of material that would produce this type of curve.   Ensure that your candidate number is shown on the separate answer sheet and ensure that the answer sheet is enclosed in your answer book.

(12 marks)

b) Explain how the t^2 equation (as shown above) can be used when designing for fire safety and how this compares with "real world" fires.

(8 marks)

Question 2

Explain your considerations when developing a comprehensive fire safety strategy specifically for heritage buildings.

(20 marks)

Question 3

a) Define the term "active fire safety protection measures" and, using examples, explain how these measures contribute to fire safety, how they assist firefighting operations and how their performance may change over time.

(10 marks)

b) Define the term "passive fire safety protection measures" and, using examples, explain how these measures contribute to fire safety, how they assist firefighting operations and how their performance may change over time.

(10 marks)

Question 4

Explain how the "pre-movement time" of an evacuation can be affected by human characteristics and behaviour.

(20 marks)

Question 5

Describe the physical and procedural measures that can reduce and control the risk of industrial explosions (not terrorism).

(20 marks)

Question 6

You have been asked to advise a local nightclub that will host a high profile international performer for the first time. The show is famous for spectacular effects including stage pyrotechnics. Demand for tickets is expected to exceed capacity.

Explain the advice that you would give to the organisers to help them to manage the event safely.

(20 marks)

[Please turn over]

Question 7

Consider a multi-occupied office building. Explain the factors and practical difficulties relevant to evacuating people who need assistance from the perspective of:

a) building management

(10 marks)

b) the people who need assistance.

(10 marks)

Question 8

A developer wishes to convert an existing large dwelling house into a 20-bed care home for the elderly. You have been asked to advise on the fire safety provisions.

A plan showing the existing layout is enclosed as a separate sheet in the examination paper.

Referring to the plan, describe your advice in relation to fire safety issues relevant to the means of escape and the associated fire resistance.

(20 marks)