

# Level 3 Certificate in Fire Science, Operations, Fire Safety and Management (All Examinations)

## Examiner Report on March 2020 Examinations

### Introduction

The majority of candidates performed well in the examinations. As in previous examination sessions, performance was particularly good on the Fire Operations examination and candidates performed least well on the Fire Engineering Science examination.

In order to achieve a pass in these examinations, candidates need to achieve at least 50% of the marks available (ie 25 marks).

### Fire Engineering Science (L3C1)

#### General

35% of candidates who sat the examination achieved a Pass.

The average mark achieved on this paper was 21.

Unfortunately, few candidates demonstrated a basic grasp of the principles that underpin fire science and this led to candidates making errors throughout the examination.

#### Multiple Choice Questions

There were 15 marks available for the multiple choice questions. The average mark achieved was 9.

Candidates generally performed best on the questions that addressed mathematics and geometry and many were able to complete the required calculations correctly. Questions focussed on decimals and angles were answered particularly well.

Questions relating to the section of the syllabus focussed on heat were often answered poorly. Candidates often made errors in identifying that water has the lowest specific heat capacity, in identifying the description of the Law of Pressures and in recognising the description of critical temperature.

The questions on hydraulics and electricity were usually answered reasonably well with candidates generally securing around half of the marks available for these areas. As in previous exams, some candidates were unable to calculate Water Power correctly. Errors were also made in recognising that the type of electrical supply that comes from mains electricity is alternating.

#### Short Written Answer Questions

The average mark attained for this section of the paper was 12. There were 35 marks available.

In order to attain marks for this section of the examination, candidates need to present information that is accurate, precise and complete. As in previous examinations, some candidates appeared to guess at answers based solely on their assumption as to the meaning of one or more words within a given term. There were many vague, sparse and generally incorrect responses. This type of response does not secure marks. Candidates must demonstrate technical understanding to obtain the marks available.

**Properties of liquids:** This was the least well answered question on the paper with few candidates able to state and describe two properties other than viscosity. Examples of properties that could have been presented in responses include:

- Capillary action - the ability of a liquid to flow in narrow spaces without the assistance of, or even in opposition to, external forces like gravity.
- Surface tension/ Cohesion - the tendency for the same kind of particles to be attracted to one another. This cohesive "stickiness" accounts for the surface tension of a liquid.
- Retention of volume - a liquid is a nearly incompressible fluid that conforms to the shape of its container but retains a (nearly) constant volume independent of pressure.

**Momentum:** This question was generally answered well and some candidates were able to provide the required explanation of the term and then carry out the calculation required. Other candidates appeared to make up their answer and some mixed up velocity and acceleration

**Absolute Zero:** Whilst some candidates demonstrated good understanding in responding to this question, others were clearly unfamiliar with the term and some candidates failed to recognise that absolute zero relates to temperature.

Candidates should be aware that absolute zero is the lowest point in temperature it is possible to achieve and is the point where molecules stop moving. Absolute zero occurs at a temperature of 0 degrees Kelvin or -273.15 degrees Celsius or -460 degrees Fahrenheit. It is used when calculating how the volume of a gas changes with temperature and pressure.

**Coefficient of linear expansion:** There were some good answers to this question but some candidates appeared to guess. Many candidates failed to realise that this related to unit length increase by 1°C.

**Atmospheric pressure:** Good responses demonstrated understanding that atmospheric pressure is the force per unit area exerted on a surface by the weight of air above. However, many candidates failed to realise that pressure is force per unit and some even suggested that it was a pressure that gave gravity to the planet.

**Flames:** This question was often answered poorly with few candidates able to explain how a diffusion flame differs from a premixed flame and few able to explain the difference between laminar and turbulent diffusion flames.

**Use of water as an extinguishing medium:** nearly all candidates answered this question well with many appearing to draw on operational experience. Candidates were often able to secure full marks for their response to this question.

**Factors affecting the resistance of a circuit:** This question was often answered well as many candidates were able to list all four of the factors correctly.

**Static Electric Charges:** This question was usually answered poorly with candidates referencing electricity in general. Candidate should be aware that static is an electrical charge produced by the transfer of electrons. Static electricity is an imbalance of electric charges within or on the surface of a material and the charge remains until it is able to move away by means of an electric current or electrical discharge. A static electric charge can be created whenever two surfaces contact and separate and at least one of the surfaces has a high resistance to electric current.

## **Fire Operations (L3C2)**

### **General**

Standards were extremely high with 96% of candidates achieving a Pass. The average mark obtained by candidates was 37 – the pass mark was 25.

Candidates appeared to draw on the knowledge and understanding relevant to their job roles and demonstrated good understanding of procedures, safety issues and technical elements of firefighting. Candidates generally performed well on both the multiple choice and short answer sections of the paper.

### **Multiple Choice Questions**

Candidates generally performed well on this section of the examination. There were 15 marks available and the average mark obtained was 12.

Questions related to incident management and operations were usually answered well but candidates sometimes made errors in responding to questions that addressed the use of equipment. Candidates often failed to recognise that, in relation to pumping from an open water supply, cavitation occurs when the pressure on the inset side of the pump is so low that the water can vapourise at ambient temperature. Errors were also made in relation to the use of a separate priming device which is necessary only with centrifugal pumps and recognition that the device used to check for background radiation is known as a survey meter.

### **Short Written Answer Questions**

Candidates performed well on this part of the examination with the average mark obtained being 26.

As with the multiple choice questions, candidates demonstrated good understanding of command and operations but weaknesses were evidence in relation to use of equipment.

**Importance of location when pre-planning for a possible incident:** As in previous examinations, some candidates missed/ignored the fact that this question was focussed on pre-planning. Instead of explaining the issues that they would consider when planning, they wrote at length about issues that could arise when managing the incident. Many candidates did provide relevant responses and many secured all four of the marks available

**Inner cordons:** Most candidates appeared familiar with the use of cordons and were able to attain most, if not all, of the marks available. Some candidates failed to follow the

precise requirements of the question and missed the fact that description of purpose and also management of the inner cordon was required. Failing to include responses to both aspects of the question meant that some candidates missed the opportunity to secure marks.

**Handing over an incident scene to the responsible individual when an incident is closed down:** The question required description of four separate actions but some candidates identified only one or two actions. Some candidates failed to focus specifically on the context of the question and drifted into descriptions of wider actions at the end of an incident such as debriefs, crew welfare, decontamination etc. Marks can be awarded only where the points raised are relevant to the question asked.

**Collecting information on the location of a fire:** This situation was clearly familiar to candidates and many demonstrated good understanding and were able to attain all of the marks available for this question.

**Hazards encountered when tackling fires in a waste site:** This situation was also familiar to most candidates and candidates often provided responses underpinned by good understanding of the issues. Some candidates went on to provide control measures but this was not required by the question and therefore no marks could be awarded for the additional information.

**Salvage operations:** This question was focused on actions to prevent damage to goods. Nearly all candidates secured all three of the marks available.

**Methods of conveying water to fireground:** This was the least well answered question in this section of the paper with few candidates providing sufficient detail of either of the methods (water carrying and water relay) asked for in the question to score high marks.

## Fire Safety (L3C3)

### General

Candidates performed well with 83% of candidates achieving a Pass. The average mark attained was 30 – the pass mark for the examination was 25.

### Multiple Choice Questions

The average mark obtained for this section of the paper was 9.

In responding to questions on elements of structure, some candidates failed to recognise the correct description of a doorset (ie the complete unit consisting of a door frame, a door leaf and all essential parts supplied from a single source) whilst others were unaware that the reinforcing rods in the lower section of a reinforced beam are provided to deal with the tensile stress.

Questions on fixed installations were usually answered well. However, few candidates demonstrated understanding that bulk dry power installations are particularly effective on fires involving flammable liquids and gases and some failed to identify the different types of fixed foam installations.

Questions addressing fire safety practice were usually answered well.

## **Short Written Answer Questions**

The average mark obtained for this part of the paper was 20. There were 35 marks available.

**Stability and insulation:** Many candidates appeared to guess at the meaning of these terms and some candidates failed to link their response back to fire resistance.

Candidates should be aware that: stability is the ability to resist collapse when exposed to fire for a specified period of time and insulation is the ability of a specimen of a separating element to restrict the temperature rise of the unexposed face to below specified levels.

**Glass:** This question was usually answered well with candidates able to describe how glass is affected by fire and to describe examples of fire-resistant glasses.

**Smoke and Heat Exhaust Ventilation Systems (SHEVS):** Most candidates demonstrated good understanding of the operation of these systems and were able to identify locations where the systems would be used.

**Wet and Dry Riser:** Most candidates were able to identify the two types of rising mains but few provided details of the differences between them other than the fact that a wet riser is a pipe kept permanently charged with water whereas a dry riser is not connected to a water supply but has connections at the base for the fire service to use to supply water to the riser.

**Flame detectors:** this question was very poorly answered with few candidates demonstrating any understanding at all of this type of detector.

Candidates should be aware that this type of detector responds to radiation emitted by the flames of a fire; radiant energy may be in the form of infrared radiation, visible light or ultra-violet radiation. Optical sensors within the detector receive the radiation emitted by the flames and this is analysed for frequency, intensity and duration. If the signals match pre-set algorithms, the alarm is triggered. Flame detectors are often used in locations such as oil and gas installations, chemical plants, fuel storage facilities, aircraft hangars and petrochemical plants.

**Control unit of a fire detection and alarm system:** This question was usually answered well with most candidates able to identify relevant functions of the unit.

**Review of risk assessments:** some candidates appeared to guess at the reasons for reviewing risk assessments. Candidates who were familiar with the subject were usually able to identify reasons such as:

- alternations to the building including internal layout
- substantial changes to furniture and fixtures
- introduction, change of use or increase in storage of hazardous substances
- failure of fire precautions eg alarm, sprinklers
- significant increase in the number of people present
- presence of children or people with some form of disability for whom special arrangements may be necessary
- actual fire incident
- regular review as per RRO

**Use of emergency lighting in buildings:** Nearly all candidates answered this question well with most securing all three of the marks available.

## Management and Administration (L3C4)

### General

Candidates performed well with 88% of candidates achieving a Pass. The average mark attained was 32 – the pass mark for the examination was 25.

### Multiple Choice Questions

Most candidates performed well on the multiple choice element of the paper. There were 15 marks available and the average mark obtained for this section of the paper was 12.

Most candidates appeared to have some understanding of all areas of the syllabus. Some candidates failed to recognise the description of functional management and some candidates made errors on questions related to budgeting; candidates were sometimes unable to identify the example of capital expenditure or to identify reasons for budgeting.

### Short Written Answer Questions

The average mark obtained for this part of the paper was 20. There were 35 marks available.

**Importance of an up to date job description:** There were four marks available for this question but most candidates secured only one or two of the marks available.

Most candidates recognised the importance of the job description in clarifying what was required from the individual in the role and many also recognised how the job description could be used in setting targets or in assessing whether or not the candidate was meeting the requirements of the job role. Other points that could have been made included the use of the job description to assess salary level, to ensure that the employees stayed within the limits of the role and to advertise for new members of staff taking on the same role.

**Organisational risk management:** Many candidates failed to realise that the question was focussed on risk at organisational level and wrote instead about management of risks at incidents. This meant that few candidates scored marks for this question. Examples of reasons why effective risk management is vital to an organisation include:

- it enables organisation to recognise and address important risks to business continuity/survival/ as failing to notice risks could lead to failure
- it enables organisations to make decisions about how to handle these risks
- it enables organisationst o monitor progress in managing these risks
- it enables resources (and accountable staff) to be allocated to address risks

**Role of managers in encouraging a positive attitude to health and safety in the workplace culture:** This question was usually answered well with many candidates clearly drawing on their own experience.

**Conflict:** Most candidates scored a high proportion of the marks available for this question. The part of the question addressing how conflict affects the performance of a team was often answered better than the part of the question asking how managers should address the conflict.

**Equality and diversity:** The question asked candidates to explain how organisations could demonstrate commitment to equality and diversity. The answers provided were often superficial with many candidates only making basic statements about treating all employees equally. Types of points which would have scored marks include the following:

- ensuring that policies and procedures do not discriminate
- setting an example in driving a culture of respect and inclusivity
- having relevant policies and procedures in place to prevent bullying, harassment and being clear that discrimination will not be tolerated etc
- commitment to listening to staff eg enabling committees
- commitment to making reasonable adjustments
- ensuring that advertising and promotion opportunities do not discriminate and are open and transparent
- ensuring equality of access for all staff to training and promotion opportunities
- having work-life balance policies in place

**Meetings:** Part a) of the question, which focussed on ways in which the Chair of a meeting could ensure that a meeting was effective, was often answered well with many candidates securing all of the marks available. Part b) was less well answered as few candidates were able to explain the importance of minutes. Some candidates confused minutes of a meeting with the agenda for the meeting.

**Role of managers in supporting training and development:** This question was usually answered well with most candidates considering issues such as performance review, providing feedback, providing opportunities to take on new tasks and enabling access to relevant training.

**On-the-job training:** Most candidates were able to identify at least one advantage and one disadvantage of this type of training. Candidates were generally better at identifying disadvantages and usually attained higher marks for this element of the question.

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