



**Examination Committee's Report on the Institution of Fire Engineers  
Examinations held in March 2011.**

***This report on the IFE's examinations held in March 2011 has been compiled by the Institution's Chief Examiner Mr Michael Quy. It is based upon individual reports submitted by the members of the Examinations Committee.***

As the Institution's Chief Examiner I am pleased to present the report for the IFE's Examinations which were held in March 2011. The report is compiled by the IFE's Senior Examiners who collated reports submitted by the subject specialists in their teams.

This year saw an increase in the number of candidates registering for the Institution's examinations as part of the UK Fire and Rescue Services training and development initiative. New examination centres were established in Cyprus, North America and the United Kingdom.

I would like to thank all candidates for taking part in this year's examinations and to commend them for their initiative and professionalism in seeking to develop their knowledge and understanding of fire engineering and related studies. I know the Examinations Committee would like to congratulate all the many candidates who achieved success in IFE exams this year. The committee also wishes to commiserate with those who did not progress as they hoped and would like to encourage them to aim for success in 2011 and beyond.

Candidates for IFE Examinations in 2012 may like to bear in mind the following points:-

1. **Every examination answer is considered on its merits.** Although examiners prepare a series of projected answers to the examination questions they set, these mark schemes do not preclude credit being awarded for other accurate, relevant knowledge and comment given by candidates. Indeed, the standardisation exercise at the beginning of the assessment period includes a critical look at the mark schemes in the light of additional legitimate responses accepted after marking a representative sample of scripts.
2. The **Study Skills** document supplied by the IFE has been revised and amended for 2012. In particular, the sections on assessment objectives and their associated trigger (or command) words have been amended. (To download this document on the IFE website, please use the following hyperlink:- [http://www.ife.org.uk/docs/Study\\_Skills.doc](http://www.ife.org.uk/docs/Study_Skills.doc). This document gives advice on the methods by which candidates can prepare for their examinations.
3. Several areas of the **IFE Examination Syllabus** have also been revised for 2012. These minor revisions can be found in the following areas:-
  - Level 3 Certificate: Paper 2 Fire Operations.

- Level 3 Certificate: Paper 3 Fire Safety.
- Level 3 Certificate: Paper 4 Management and Administration.
- Level 4 Certificate: Paper 8 Fire Investigation
- Level 4 Certificate: Paper 11 Civil Emergency and Disaster Management.

Candidates should therefore ensure they study from the current 2012 version of the syllabus rather than from copies they may have downloaded previously.

4. As in previous years, candidates lost marks in the examinations of 2011 in one or more of the following ways:-

- **Lack of preparation.** A number of candidates wrote several answers that gained pass marks, but as they had not covered the whole syllabus thoroughly enough, the rest of their answers did not reach the same standard and consequently their final mark fell short of a pass. It was also clear that many candidates relied upon their own experience in writing their answers rather than revise from appropriate source material.
- **Lack of relevance.** Many candidates wrote a good deal of information on a particular topic without **applying** this information **to the wording of the question**. (For example, they may have written a **list of bare facts** when the question asked them to **discuss the merits and disadvantages** of a course of action. Again, some candidates wrote in general terms when they were asked to address a particular scenario as described in the question.) Candidates should ensure the information they write down is relevant as well as accurate, and that their knowledge is applied in the way that the phrasing of the question demands.
- **Lack of planning.** It is important for candidates to organise their thoughts and structure their answers **before** they begin writing essays in an examination. Even a brief plan can provide some systematic method and structure to help achieve this.
- **Poor time management.** Candidates should divide the time available for the examination evenly among the questions they attempt so that each one can be answered carefully and thoroughly. Every year many candidates complete two or three good answers at length and gain high marks for them. Unfortunately this leaves insufficient time for the remaining answers which can be spoiled by careless errors, or they are written very briefly without the detailed information necessary to secure a pass.

At the end of another busy year it remains my privilege to thank all examiners (whether new this year or well-established,) for continuing to develop and enhance the IFE's examinations service by applying their expertise and energies generously and tirelessly on behalf of the Institution's candidates.

**Michael Quy BEng (Hons) FIFireE**  
**Chief Examiner, the Institution of Fire Engineers.**

## Level 4 Certificate Examinations

### Paper 1: Fire Engineering Science

#### **Question 1**

*Discuss the growing potential for using **video smoke detection (VSD)** in tunnels and other challenging fire protection scenarios.*

*(20 marks)*

Candidates who had read the relevant articles in the *Fire Risk Management Journal* produced some good answers and gained good marks. Where candidates did not achieve good marks, this may be accounted for by a number of reasons:

- i. Failing to read the question properly, i.e. the question did not ask for a detailed explanation of the workings of standard smoke detection systems.
- ii. Failing to convince the examiner that they understood that VSD used complex computer algorithms and was easy to install.

Good answers incorporated within the narrative references to VSD applications other than tunnels, a reference to smoke detection in tunnels being problematic due to dirt and exhaust fumes and the location of smoke being readily identified by VSD using cameras at multiple points. This question was designed to give candidates the opportunity to express original thoughts, ideas etc of the potential for the use of VSD. However in general, this failed to materialise and most of the scripts showed little creative thought.

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#### **Question 2**

*Discuss the methods available to ensure safety in using electrical apparatus in flammable atmospheres.*

*(N.B. Do **NOT** include discussion of **flameproofing** and **intrinsic safety** in your answer.)*

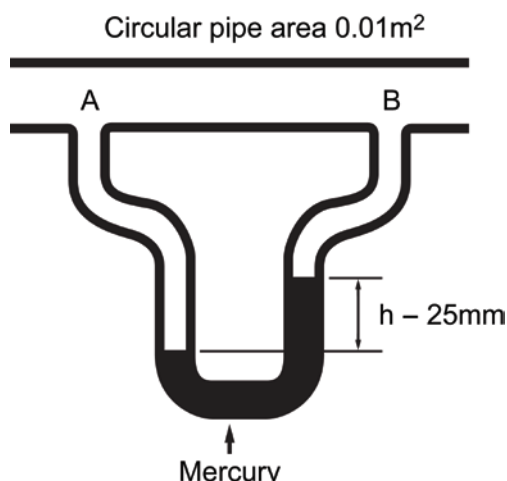
*(20 marks)*

This question was not answered well by many who attempted it. Some candidates produced answers that were not relevant to the question and included detailed explanations of flameproofing and intrinsic safety methods, which were specifically excluded by the question. It was expected that candidates would demonstrate a detailed knowledge of other methods such as powder filling, oil inversion and the zone classification system.

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### Question 3

In the diagram below water flows along the pipe at a velocity of two metres per second.



- What is the difference in pressure between A and B?  
(Answer in Bar or Pascal. The density of mercury is 13.6.)  
(7 marks)
- If the distance between A and B was three times greater, what would be the new value of  $h$ ?  
(3 marks)
- What is the flow in litres per minute?  
(6 marks)
- If the flow became 2400 litres per minute, what would then be the value of  $h$ ?  
(4 marks)

Many candidates scored high marks for this question and in general it was answered well. Of those who failed to achieve good marks, some were unable to make accurate calculations while others used either incorrect formulae or incorrect scientific notation or they attempted to use Bernoulli's equation when it was not necessary to do so. The use of Bernoulli's equation was a particularly complex way of solving the problem and as a result those choosing this approach rarely achieved correct results.

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### Question 4

For each one of the chemicals listed below, **discuss the following**:-

- Their **toxicity**
  - The **precautions** for handling and storing them
  - Their **reaction** with firefighting media
- Ammonia (5 marks)
  - Hydrocyanic acid (5 marks)
  - Cadmium (5 marks)
  - Barium (5 marks)

This question gave candidates the opportunity to pick up some good marks relatively easily. However this proved not to be the case and in general the question was poorly answered. Many candidates mentioned every type of precaution for handling and storing the hazardous substances that came to mind. In some cases the precautions were contradictory. Some candidates applied *the scatter gun approach* to each part of this question which demonstrated that few had any in-depth knowledge of the subject. All that was required for good marks was a systematic, well structured narrative of the main points highlighted by the question.

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### Question 5

*In relation to post-flashover fires within compartments:-*

- a) **Describe in detail a ventilation controlled fire.** (10 marks)
- b) **Describe in detail a fuel controlled fire.** (10 marks)

Candidates produced many good descriptions of flashovers. However this question referred to **post-flashover fires within compartments**, which changes the emphasis of the scientific knowledge required to answer it. In order to gain good marks candidates needed to detail what constitutes a ventilation controlled fire (i.e. where the burning rate is limited by available ventilation and where the combustion of the fuel is incomplete and is proportional to incoming flow rate that does not depend upon the fuel supply rate). Secondly, they had to describe in detail a fuel controlled fire (i.e. where the amount of fuel is lower than that which could be oxidised by available oxygen; where it is proportional to the surface area of ignited fuel, and does not depend on incoming airflow rate). In general candidates had little idea about post-flashover conditions, and it appears that this area of the syllabus has been neglected. Most candidates at Level 4 understand the basics of **flashover**, but this question required a greater depth of knowledge in order to achieve a pass mark.

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### Question 6

**Describe in detail the main features of the following:-**

- a) *Premixed combustion.* (5 marks)
- b) *Diffusion combustion.* (5 marks)
- c) *Momentum jet fires.* (5 marks)
- d) *Buoyancy dominated fires.* (5 marks)

Successful candidates picked up good marks by describing in detail the main points of *premixed* and *diffusion combustion* and it was apparent that both topics were well understood. However, *momentum jet fires* and *buoyancy dominated fires* were less well understood and consequently few candidates scored high marks in these sections of the question. Examiners were looking for detailed descriptions, for example:-

- i. Momentum jet fires have high flow rate of turbulent fuel and a typical example would be the emergency flare that relieves pressure in a chemical plant.
- ii. Buoyancy dominated fires have a low fuel flow rate and a typical example would be the burning of a condensed fuel when the momentum of volatiles rising from

the surface is unimportant. The flame can be laminar (if the fuel bed is less than 0.05m in diameter), and fully turbulent (if the fuel bed is greater than 0.3m).

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### Question 7

A dam 10 metres by 3 metres by 1 metre deep is filled by two pumps in 5 minutes. The pumps are working at a pressure of 7 bars and are both driven by engines of 35 kilowatt brake power.

Given that the first pump is delivering 2,200 litres per minute, **calculate the efficiency** of both pumps.

(20 marks)

Most candidates who attempted this question gained good marks, with many achieving full marks. In general the methodology required to answer this question was well known, and is as follows:

- i. Calculate the capacity of the dam in litres.
  - ii. Calculate the flow rate.
  - iii. Calculate the water power using the formula:-  $WP = \frac{100LP}{60}$
  - iv. Calculate the pump efficiency using the formula:-  $E = \frac{WP}{BP} 100\%$
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### Question 8

Mixed fuel is composed of **methane** (volume per cent is 0.60), **carbon monoxide** (volume per cent is 0.25) and **hydrogen** (volume per cent is 0.15).

**Calculate:-**

- a) The lower flammable limit concentration for the mixture. (10 marks)
- b) The concentration of each component in the mixture with air (10 marks)

**Lower flammable limit (LFL) data:**

Methane:	LFL (% volume)	5.0
Carbon monoxide:	LFL (% volume)	12.5
Hydrogen:	LFL (% volume)	4.0

The majority of candidates who attempted this question failed to gain a pass. This was due in most part to their inability to calculate the fuel mixtures set in the question.

For **part a**, to find the Lower Flammable Limit (LFL) of the mixture:-

- i. To set up each component as a fraction with the % volume as the numerator and the LFL (% volume) as the denominator.
- ii. Add each component of the fraction.
- iii. Divide the answer by 1. Therefore the LFL for the mixture is 5.63%

For **part b**, to find the concentration of each component of the mixture:-

- i. Take the % volume of fuel multiplied by the LFL of the mixture e.g. Methane  $0.60 \times 0.0563 = 0.0338$ .

It is important that candidates should be able to carry out this type of calculation.

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## **Paper 2: Fire Safety**

### **Question 1**

*You have been asked to provide advice on the construction and installation of a kitchen extractor system in a mixed use building containing residential and commercial units.*

a) **List the main points** you would include in your advice and **briefly explain** each point.

(17 marks)

b) **Identify** the three main ways in which fires may spread in ductwork.

(3 marks)

Successful candidates highlighted the need for dampers, regular inspection hatches and fire stopping when the ducting passes through compartmentation. However some candidates did not fully understand the purpose of dampers and confused the need for detection in voids that the extraction passed through, with putting detection in the extraction. Some candidates also talked of putting sprinklers in the extraction. Misguided answers like these attracted fewer marks.

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### **Question 2**

*What measures would you recommend when installing fire protection systems and procedures into heritage buildings with public access in order to preserve the original features of the building and ensure the safety of the public?*

(20 marks)

Candidates who gained good marks on this question highlighted the problems of retro fitting fire safety systems into a heritage building without disturbing its structure or appearance. Knowledge of modern alarm systems, using greater staff numbers and compartmentation could be used to overcome any shortfalls in the provision of fire safety systems. Unsuccessful candidates tried to install modern engineered solutions (such as pressurisation, sprinklers and suppression,) without considering the consequences for the fabric of the building. In the main, they also failed to mention a salvage plan. Overall many candidates' performance revealed a failure to read the question properly.

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### **Question 3**

*Following a series of arson incidents on the school premises, the head teacher has requested advice on a series of fire safety measures that can be introduced to reduce the threat.*

**Detail** the advice you would give.

(20 marks)

Good answers were provided by candidates who suggested a comprehensive range of measures and recognised the importance of the management role in combating arson. A number of candidates gained low marks because they focused on security to the exclusion of all other measures, whilst others made suggestions that were unrealistic or inappropriate for a school.

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#### **Question 4**

- a) What does the acronym **ASET** stand for? (1 mark)
- b) What are the three main **tenability criteria** which should be considered when determining the **ASET**? (6 marks)
- c) What does the acronym **RSET** stand for? (1 mark)
- d) **Detail** the formula used for **RSET**. (4 marks)
- e) **Discuss** in general terms the elements of the formula for **RSET** and the factors which influence **occupant behaviours**. (8 marks)

Successful candidates demonstrated that they had a clear knowledge of the topic and were able to clearly define the terms, as well as the criteria and formula. They were also able to discuss the factors influencing occupant behaviours. Those candidates who were unsuccessful demonstrated little or no knowledge on the topic, and did not even define the terms correctly. There was a very clear separation between those who had studied this area and those who had not.

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#### **Question 5**

**Discuss** how the **effective management** of fire safety measures for a building safeguards the protection of the occupants. (20 marks)

Candidates who included in their answers a range of areas where fire safety management was required scored high marks for this question. Those who scored low marks did not recognise the central importance of the phrase “*effective management*”. They answered the question at a lower level by listing fire particular safety measures that could be adopted. By and large these candidates gave very generic answers that did not address the wording of the question.

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#### **Question 6**

- a) **Discuss in detail** the general principles underpinning the planning, training and monitoring activities as defined in the fire safety manual for a building. (12 marks)

- b) **List EIGHT elements** that should be included in a workplace fire safety training package. (8 marks)

Many candidates were able to score full marks on part b) of this question. However part a) was generally poorly answered, with too many candidates relying on basic generic fire safety answers.

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### Question 7

- a) **Identify and explain** the range of factors that determine the time at which the first sprinkler in a system will operate. (12 marks)
- b) **List** the three categories into which modern sprinkler bulbs are grouped. (3 marks)
- c) **Define** the term **sensitivity** in relation to sprinkler bulbs. (5 marks)

Successful candidates recognised that in part a), the following were all relevant factors:-

- i. The rate at which heat was released by the fire.
- ii. The height of the ceiling above the fire.
- iii. The distance of the sprinkler head below the ceiling.

Many candidates misread part b) and listed the categories of sprinklers not bulbs. In part c) many candidates also assumed that sensitivity related only to the colour of the bulb.

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### Question 8

**Smoke curtains** and **fire curtains** are used in a variety of building applications.

- a) **Describe** the main features of **smoke curtains** and **fire curtains**. (6 marks)
- b) **Explain in detail** the principles by which they operate. (6 marks)
- c) **Discuss** their practical applications. (8 marks)

Candidates who successfully answered this question recognised the link between smoke curtains and SHEVS and were able to provide a variety of applications where they are used. Unsuccessful candidates did not establish a difference between smoke curtains and fire curtains: they also failed to make the link with existing means of escape.

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## **Paper 5: Strategic Human Resource Management**

### **Question 1**

- a) **Describe** the characteristics of an effective team. (10 marks)
- b) **Outline** the reasons why some teams fail to function effectively. (10 marks)

Successful candidates had read the question carefully and were therefore able to apply their knowledge in answering it. They clearly understood the characteristics of an effective team (such as dynamism, responsiveness and commitment,) and then could identify the circumstances which can cause a team to be ineffective. Many unsuccessful candidates simply did not provide sufficient information to obtain a pass mark, while others focused on the **management** of teams, forgetting that the question asks for the **characteristics** of an effective team.

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### **Question 2**

- a) **Define** the meaning of the term **360 degree feedback**. (3 marks)
- b) **Describe** the benefits of **360 degree feedback** for individuals as well as organisations. (12 marks)
- c) *In order to implement **360 degree feedback** successfully, organisations need to take account of the problems that can arise from its use.*
- Describe** the problems associated with **360 degree feedback**. (5 marks)

Candidates who clearly understood the principle of 360 degree feedback invariably gained high marks. They knew the benefits that this type of appraisal has for both an employee and the employer (based on promoting a climate of continuous improvement on all sides,) and the problems that need to be overcome when introducing a new method, (such as too little candour and follow-up action together with too much bureaucracy). Those who were unsuccessful tended to write about appraisal interviews in general and did not understand the benefits 360 degree feedback can bring or the potential problems that could arise when the technique was introduced.

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### **Question 3**

- a) What is the **difference** between **training** and **development**? (5 marks)
- b) **To what extent** can these processes occur through the use of courses? (15 marks)

Those candidates who were successful in this question clearly understood the difference between training and development (where training is job-oriented while development is career-oriented,) and they could identify the contribution that courses can make to both. In the main the pay-off for development is medium to long term, while it is immediate in the case of most training events. Those who were awarded low marks often saw training and development as one and the same thing and wrote about the running of a training course.

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#### **Question 4**

*“Valuing and promoting **equality** and **diversity** are central to the effectiveness of a modern organisation.”*

**Discuss** this statement.

(20 marks)

Successful candidates clearly understood the concepts of equality and diversity and were able to define the terms clearly. They also realised that successful organisations should reflect the diversity that exists in society by including staff from a wide range of societal groups. The organisation’s reputation would be damaged if it was seen to be discriminatory rather than inclusive. Unsuccessful candidates were often on the right lines but provided insufficient information to obtain the pass mark or did not realise that creating an inclusive culture where equality and diversity are promoted means challenging discrimination and other unacceptable behaviours.

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#### **Question 5**

**Explain** why it is important for budget planning to be based on an organisation’s **strategic plan**.

(20 marks)

Those candidates that were successful in this question understood why and how an organisation’s budget should be linked to the strategic plan to ensure that expenditure contributes to the achievement of organisational objectives. As the strategic plan identifies priorities for the allocation of resources, this makes budget planning integral to the process of implementing corporate, departmental and team plans. Unsuccessful candidates tended to write wholly about strategic planning, whilst failing to make this connection and so missing the point of the question.

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#### **Question 6**

**Describe** the characteristics of organisations that are committed to providing quality goods and services.

(20 marks)

Successful candidates clearly understood that a variety of factors are present in an organisation that is committed to providing quality goods and services. Clearly one vital factor is the introduction of Total Quality Management. Those who failed to achieve a pass in this question often wrote about the main features of a particular Quality

Assurance System without identifying other factors such as commitment to meeting the needs of customers and other stakeholders, training and development and effective planning.

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### Question 7

- a) **Explain** the reasons why effective **knowledge management** can improve the performance of an organisation. (14 marks)
- b) **Describe** three different **knowledge management systems** that organisations can use to share information with staff. (6 marks)

Good marks were given to those candidates who understood the link between knowledge management (KM) and organisational effectiveness and who then went on to identify three KM systems. Essentially this is what enables an organisation to make the best use of accessible knowledge and skills and the expertise of staff. Candidates lost marks when they tended to describe in detail explicit and tacit knowledge without applying the information provided directly to the question. Many candidates also failed to identify or describe in detail KM systems as described in the source written by Armstrong among which are creating an intranet; establishing a network of interest and mapping out sources of expertise.

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### Question 8

- Explain** the benefits that a well planned and clearly structured **disciplinary procedure** can have for managers. (20 marks)

Successful candidates understood the wide ranging benefits which a clearly structured procedure has for a manager. These included an understanding of expected standards of conduct and job performance and the provision of systematic written records for future reference. Unsuccessful candidates tended to write in narrative detail about the stages of a disciplinary procedure and failed to make a link between the procedure and the benefits for a manager. Level 4 Certificate candidates are expected to be able to apply information to a given scenario and not just describe a procedure albeit in detail.

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## **Paper 6: Fire Service Operations**

### Question 1

*Large domestic animals can become trapped or stranded, for example in cattle grids, water courses and soft ground.*

- a) **Briefly discuss** whether or not a fire and rescue service should deploy resources to deal with incidents like this. (5 marks)

- b) **Detail** the main points you would include in a **standard operating procedure (SOP)** for attendance at this type of incident.

(15 marks)

Successful candidates discussed the issues why fire and rescue services should or should not attend incidents like these. They explained the meaning behind the points they were making and also highlighted the risks to both the rescuers and the animal involved. Unsuccessful candidates relied on current legislation in confirming attendance rather than discussing the possibility of not attending such an incident. They also ignored the fact that the action or inaction of fire and rescue services can have consequences with respect to the attention of the media that may result in bad press. Some candidates also produced a list of bullet points but failed to expand upon them. At this level candidates need to articulate clearly and in depth the points they wish to make.

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### Question 2

You are part of a team tasked with producing guidance on the **management of rescues from water**.

- a) **Discuss** the issues raised by using volunteers and their equipment at this type of incident.

(5 marks)

- b) **Explain** the key elements in planning for the **three phases** of incidents involving rescue from water.

(15 marks)

Candidates gaining good marks accepted that volunteers were inevitable and useful but they also demonstrated that they could be a liability. They identified the three phases as 'before', 'during' and 'after' the incident and went on to explain each planning element and why it was relevant. Some candidates wrongly identified the phases (often mistaking them for technical qualifications), whilst others confused bystanders with volunteers. Inevitably these answers attracted low marks that did not reach pass grade level.

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### Question 3

**Discuss** how technological advances and revised operational procedures can be effective in reducing the incidence of malicious false alarm calls.

(20 marks)

Successful candidates discussed the uses that technology can be put to and the possible behaviour changes that could follow from procedural changes. They also discussed the potential implications of a fire and rescue service's decision whether to attend or not. Unsuccessful candidates discussed methods to reduce unwanted fire signals in general. Given that they could have been caused by human error or faulty equipment there is an essential difference between them and malicious calls.

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### Question 4

**Discuss** the factors that should be taken into consideration when undertaking rescues of persons from cliff faces.

(20 marks)

High marks were awarded to those who gave an explanation of the factors to be considered, and included reasons as to why the points should be included. However few candidates did score high marks for this question as many supplied lists of considerations that lacked any substantial content, or they gave generic answers based on incident command.

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### **Question 5**

*You are the officer in charge of a fire in an agricultural silo on a farm that is a considerable distance from the nearest urban area.*

- a) **Discuss** the difficulties you should anticipate in order to fight the fire effectively.

(10 marks)

- b) **Describe** how you would mitigate the dangers to operational personnel in this situation.

(10 marks)

Successful candidates not only described the practical difficulties of fighting a fire of this sort, they also explained the implications behind them. They then linked the mitigating measures to be taken in respect of this particular incident (not a generic one,) and went on to explain how the actions taken would protect personnel.

Unsuccessful candidates however produced narrative lists and gave generic incident command statements that had no link to the question on silo fires.

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### **Question 6**

- a) **Explain** the purpose of ventilation at fires.

(5 marks)

- b) **Discuss** the theory and use of **positive pressure ventilation** at incidents.

(15 marks)

Good marks were awarded to candidates who showed understanding of what ventilation at fires achieved for the firefighters, the casualties and the buildings. They also understood what makes positive pressure ventilation work, and could explain the practical methods of carrying out PPV.

Unsuccessful candidates on the other hand gave answers that lacked content. They gave basic information, but then failed to explain how this would have any effect on the incident.

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### **Question 7**

*When subjected to heat and fire, acetylene cylinders can cause serious injury or death and the destruction of property.*

**Discuss** the relative merits of the different options available to bring incidents involving acetylene cylinders to a safe and successful conclusion.

(20 marks)

To achieve a high mark with this question candidates needed to be well read and to discuss a variety of ways in which the dangers associated with acetylene cylinders are dealt with. This should have included comment on the different established practices and the research already performed. Some candidates failed to understand the question and gave a short version of their current standard operating procedure. Although it would have gained them some marks, this approach was clearly too limited to reach a pass level mark for them.

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### Question 8

*The management of operational incidents is a major responsibility of fire officers.*

- a) **Describe** in detail the tactical modes, giving appropriate examples of each. (10 marks)
- b) **Discuss** the need for an incident command structure. (10 marks)

Successful candidates gave comprehensive descriptions of the tactical modes, and clearly explained the requirements of an incident command structure, viz:-

- Why it is important.
- What it does for the management of incidents.
- What happens when a command system is in place.

Candidates lost marks when they failed to describe the tactical modes, and thought that what mattered was whether the operational incident was “in” or “out” of a building. They also often gave only a sketchy outline of an incident command system.

Overall part a) was answered well by most candidates who attempted this question.

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## Paper 7: Aero Fire Studies

### Question 1

*You are the Station Commander at a Category 5 civil airport. A large, wide bodied military aircraft (for example, a Super Hercules) has declared an emergency and must land at your airport within the next twenty minutes.*

- a) **List** the immediate problems that you must consider with this type of aircraft landing at your airport. (5 marks)
- b) **Outline** the actions that you will take in each of the following phases of the emergency:
- During the twenty minutes prior to landing*
  - During the final approach*
  - After the aircraft lands*
- (15 marks)

As expected this was a popular question that was answered well by most candidates. Successful candidates included in their answers considerations similar to the following:-  
For part a)

- Is the airport too low a category to deal with the size of the aircraft?
- Are enough personnel and appliances available?
- What cargo is the aircraft carrying?
- What emergency medical service provision is needed?

For part b)

- Mobilise appliances, personnel and equipment.
  - Brief and deploy emergency services back up.
  - Initiate emergency plans and maintain communications with air crew.
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## Question 2

- a) **State the two main criteria that determine the size of any on-shore heliport.**

(5 marks)

- b) **State the five criteria that will determine the size and strength of heliport taxi ways.**

(15 marks)

This question was not answered well by most candidates who attempted it. Successful answers to part a) included consideration of the size of craft using the heliport and whether the approaches to it were clear of obstacles. Part b) carried the majority of marks available and required detailed answers that covered the size and type of helicopters using the taxi ways, as well as consideration of the procedures in use and the facilities provided.

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## Question 3

- a) **List the most common types of metals used in aircraft construction.**

(4 marks)

- b) **Describe where in the structure of the aircraft each one of these metals is most commonly found.**

(8 marks)

- c) **Explain why each one of these metals is used in the construction of certain parts of an aircraft.**

(8 marks)

Generally, candidates attempting this question answered it well. Some gained nothing by including materials such as wood in their answers when metals were clearly specified. Most candidates correctly identified the different metals used: the most successful were also able to relate the properties of each to the particular requirements of the different parts of the aircraft.

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#### Question 4

Where dangerous goods are to be carried by an airline, they must be accompanied by a **dangerous goods transport document** (or **shipper's declaration for dangerous goods**).

**List** the information found on the document.

(20 marks)

This question was answered confidently by most candidates attempting it. Generally they demonstrated a detailed knowledge of the document and were able to list the 16 items of information it contained.

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#### Question 5

You are the officer in charge at an aircraft crash involving a modern military helicopter that is carrying troops, weapons and armaments.

**Outline** the following:

a) Your priorities in dealing with this incident; (10 marks)

b) The dangers associated with the weapons and armaments. (5 marks)

c) The standard operating procedures for dealing with **man made mineral fibres** (MMMMF). (5 marks)

Unfortunately too many candidates derived an answer from either their own experience or limited knowledge rather than apply knowledge gained directly from relevant sources. Given that assessing risk was an essential part of answering this question, it is surprising that some candidates suggested that firefighters should handle rockets and guided missiles and remove them from the aircraft while firefighting operations were still in progress.

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#### Question 6

Shortly after landing at an airport, the captain orders a full emergency evacuation of the passengers.

**Outline the different factors** that must be taken into account during the evacuation of the passengers by:

i. The flight crew. (10 marks)

ii. Firefighting and rescue personnel. (10 marks)

Generally, this question was poorly answered by those candidates who attempted it. A surprising number of candidates suggested that firefighters should have priority in

entering the aircraft to fight fires while passengers were trying to escape through the emergency exits. Few suggested that they might assist with the evacuation. Candidates who gained high marks detailed the different roles and responsibilities of the flight crew and the airport firefighters. They also included consideration of the flight crew's emergency plan, the emergency procedures of the airport being used and the information passed to the flight crew by air traffic control and the ARFF.

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### Question 7

*Aircraft hangars used for the storage, maintenance or housing of aircraft can be classified into groups according to various criteria.*

**Name and describe** the criteria for each of these groups.

(20 marks)

This was a popular question and candidates demonstrated detailed knowledge of the criteria for the classification of aircraft hangars into three groups. The differences in door height and in the size of the single fire area involved formed the basis of the classification.

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### Question 8

a) **Describe** the concept of **zones of control** at an aircraft accident.

(5 marks)

b) **Name and briefly describe** each one of these zones.

(15 marks)

Most candidates attempting this question achieved pass marks with their answers but very few demonstrated the detailed knowledge that comes from studying relevant sources and none achieved full marks. The first part of the question focused on the effective control of an accident site in which a variety of interested parties become involved. The second part carried the majority of the marks available and covered the incident site itself, the area reserved for emergency services and the outer zone for other agencies involved. In addition, the operation and location of incident control points should have been considered.

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## Paper 8: Fire Investigation

### Question 1

a) *With regard to fatal fires, discuss* the phenomenon known as **the wick effect**.

(6 marks)

b) *A fundamental feature of the investigation of fatal fires is the identification of the deceased.*

**List and briefly describe** the methods available to the investigator to confirm the identification of the victim(s) of fire.

(14 marks)

Candidates were required to explain what is meant by the “wick effect” before explaining how bodies could be almost completely destroyed in relatively low temperature fires. Successful candidates went on to provide the details of the evidence required, and how identification of the victim can be made. Although this appeared to be a popular question many candidates failed to gain good marks for their answers because they neglected to provide in depth relevant details when forming their answers.

---

### Question 2

**Burning indicators** provide the basis for the determination of the point of origin and cause of fires. Many methods of **origin determination** previously regarded as valid have since been discredited or found to be unreliable.

**Discuss** the following **methods**, **explaining** the reasons why they cannot always be relied upon:-

- a) Using depth of char in the timber as an indicator of burning time (5 marks)
- b) Collapsed furniture springs as the point of origin (5 marks)
- c) Classifying the lowest point of burning as the point of origin (5 marks)
- d) Using **spalled concrete** as an indication of the use of liquid accelerants (5 marks)

Approximately half of the candidates who attempted this question achieved good marks simply by reading the question carefully and answering it directly. Those who lost marks did so because they misread the question or they provided unstructured information. For example, using depth of char as a method assumes a constant rate of 0.6mm per minute, but this takes no account of the different types and densities or treatments of timber, or even the ventilation profile of the fire. Similarly, candidates should have explained the basis of using every method in the list and then explained how the variables render each one less reliable than previously accepted.

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### Question 3

- a) **Define** the following terms:
  - i. Combustion
  - ii. Deflagration
  - iii. Explosion
  - iv. Detonation(8 marks)
- b) You are called to investigate an apparent explosion and fire at a two storey domestic property with obvious signs of blast damage.

With **particular reference to the explosion**, what pieces of **evidence** would you record and why?

(12 marks)

Overall this question was poorly answered. Although candidates generally gave good answers to part a) showing that they had a clear understanding of the definitions required, many candidates however lost marks in the second part of the question by giving confused responses that lacked relevant information. The evidence required for part b) focused partly on the condition and position of displaced items such as structural components, furniture and appliances. Weighing debris and measuring its distance from the epicentre should also be recorded.

---

#### Question 4

a) Define the term **incendiary fire**.

(4 marks)

b) There are a number of conditions related to **fire origin and spread** that may point to an incendiary fire as the cause.

**List and briefly describe eight examples of these conditions.**

(16 marks)

This question proved popular with candidates, with many picking up good marks. Those who were not successful appeared not to understand the term **incendiary**. This term relates to a fire that is intentionally started in circumstances where the person responsible knows that the fire should not be ignited. Among the examples of fire origin and spread requested are the following:-

- i. **Trailers**; where fuels have been distributed with the intention of spreading the fire from one area to another.
  - ii. Incendiary devices; whether simple or complex they include Molotov cocktails and mains or battery wired mechanisms.
- 

#### Question 5

For a lit cigarette to cause flame to evolve from upholstered soft furnishing, **describe** the following factors:-

- i. The **conditions** required.
- ii. The **time frame** necessary.
- iii. The **mechanisms** involved.

(20 marks)

Successful candidates demonstrated a clear understanding of the conditions required; the time frame and the mechanisms involved. (These conditions included direct contact with the fuel which had to be capable of being ignited by a smouldering source.) Unsuccessful candidates provided answers that contained little relevant information. In making bland generalisations, these candidates did not explain why in some cases only a linear scorch would result from a smouldering cigarette whereas in others ignition of the furnishings would occur.

---

### Question 6

- a) Give the correct definition of the term **electrical arc**. (2 marks)
- b)
- i. With the aid of an **annotated diagram**, describe in detail the theory of **arc mapping**.
  - ii. **Discuss** the limitations of this theory with regard to a compartment fire scene investigation. (18 marks)

The majority of candidates who attempted this question were successful, providing adequate diagrams and describing the theory of arc mapping in detail. In discussing its limitations they focused on confusing evidence, for example where fires destroy arcing evidence or where melting cannot easily be differentiated from arcing. This is a technical subject and although some candidates began well with a sound definition of the term, their lack of detailed knowledge was evident throughout their answers.

---

### Question 7

- a) Ignition by a **self heating reaction** can occur as a result of a chemical reaction. **Describe** the circumstances required for a fire to occur as a result of this process. (12 marks)
- b) **Explain** what evidence may be found by an investigator at a fire scene to support a conclusion that the fire was caused by self heating. (8 marks)

Successful candidates had a very good level of understanding and provided detailed information in the answers they gave. They understood that self-heating is an exothermic reaction and that, amongst other circumstances, heat had to be generated at a rate greater than it was lost to its surroundings to enable the temperature to build up. Those candidates who were not successful failed to answer the question being asked, especially in regards to part b) where their answers were often too general and did not focus on the fuel, timeframe and circumstances associated with self-heating reactions.

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### Question 8

- a) **Explain four** factors that will affect the spread of a **wildland fire**. (12 marks)
- b) With the aid of an **annotated diagram** describe **four** types of **directional indicator** that may be found at a wildland fire scene. (8 marks)

This question proved to be popular and produced a good quality of answer on the whole. Those candidates who provided the diagram scored well whilst candidates who failed to do so lost the opportunity to acquire extra marks quite easily. The strength and direction of the wind, linked to the topography of the land affects the spread of wildland fires, while the depth of charring and the discoloration of rocks and boulders are examples of the directional indicators that were often quoted by successful candidates.

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## **Paper 11: Civil Emergency and Disaster Management**

### **Question 1**

*With the aid of an **annotated diagram**, explain what is meant by the term **disaster response and contingency planning**.*

*(20 marks)*

In general, this question was poorly answered by those candidates who attempted it. Most candidates had not studied from relevant sources and confused this question with one from a previous paper that had asked about time lines in disaster management. Candidates from one particular centre had evidently organised their sources and their revision as a group. As each candidate in the group achieved high marks for this question, their combined efforts at preparation had clearly paid off. The key to this question lay in the development of organisational readiness to anticipate and to respond to an emergency. This takes a variety of different forms; for example national or international institutional planning; disaster response plans that are preliminary and generic in nature; contingency plans based upon known risks and standard operational procedures.

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### **Question 2**

***Describe** the factors that have to be taken into account when undertaking a **cost benefit analysis** of a large scale disaster management exercise.*

***Compare** these factors with those that are considered for other types of training.*

*(20 marks)*

On the whole, answers to this question were disappointing. Candidates were required to demonstrate an understanding of the objectives to be achieved; the roles to be tested and the benefits to be derived as well as list the costs involved in undertaking a training exercise such as this. Other types of training included table top exercises, computer simulations and small scale scenario exercises together with their related benefits and costs.

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### **Question 3**

***Describe** the operational difficulties that emerge in the early stages of disaster response when an act of terrorism is suspected.*

*(20 marks)*

This question was popular with candidates and in general they answered it well. The question required detailed knowledge and understanding of risk assessment; first aid and evacuation, incident command and liaison, damaged structures, hazardous materials and possible secondary devices while preserving the scene for further investigation.

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#### Question 4

The role of locally elected politicians in a civil emergency can be divided into the following three distinct phases:

- i. **Before** the emergency
- ii. **During** the emergency
- iii. **After** the emergency

For each of these phases, **explain** the role of the elected members.

(20 marks)

This question was generally popular and well answered. Successful candidates summarised the role of elected members as facilitative and supportive without interfering and focused in particular on the following:-

- i. Drafting emergency plans beforehand to establish and test roles, training programmes and procedures.
  - ii. Providing adequate resources, specialised knowledge and briefings to voluntary agencies and the media.
  - iii. Monitoring the effectiveness of the emergency plan; attending debriefing sessions; assisting in the clearing up and reconstruction phases.
- 

#### Question 5

*A major disaster scene will contain **site hazards** to which emergency workers will be exposed.*

a) **List** the possible site hazards.

(10 marks)

b) **Describe** how site hazards can be eliminated or minimised.

(10 marks)

Unfortunately too many candidates relied on deriving an answer from their own experience or limited knowledge rather than applying knowledge gained directly from studying relevant sources. In identifying the hazards requested in the first part of the question candidates should not have experienced difficulty in providing a comprehensive list. The second part of the question involved relating items such as command and control, risk assessment and evacuation procedures to the specific hazards listed beforehand. This was not intrinsically difficult and yet the answers to this question were, in the main, disappointing.

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#### Question 6

*The recovery of bodies from a major disaster is an integral part of the identification process.*

**Outline** the factors that have to be taken into consideration when managing a site during body recovery.

(20 marks)

Most candidates who attempted this question submitted good answers that revealed they had studied from a range of relevant sources. Highly marked answers demonstrated knowledge and understanding of the following factors:-

- i. Roles and responsibilities of the emergency services involved.
  - ii. Factors affecting the scale of operations; e.g. the type of incident and its location.
  - iii. Range of appropriate risk assessments to be carried out beforehand.
  - iv. Systematic removal and storage of bodies.
  - v. Facilities for the recovery team.
- 

### **Question 7**

**List and explain** the types of assistance that the military services can give to civilian services in a disaster.

(20 marks)

The majority of candidates attempting this question answered it successfully. In addition to supplementing the manpower required for labour-intensive tasks, the military can offer a very comprehensive range of skills and equipment to the civilian services in order to facilitate the following operations:-

- i. Medical services.
  - ii. Search and rescue operations.
  - iii. Engineering operations.
  - iv. Information gathering.
- 

### **Question 8**

**Key training topics** form the core of successful planning objectives in disaster preparedness.

**Describe in detail** the key training topics.

(20 marks)

It was gratifying to note that most candidates attempting this question provided good answers that covered the following points:-

- i. Communication; roles and responsibilities, training in procedures, technology and terminology.
  - ii. Liaison and co-ordination; regular contact with personnel from key organisations.
  - iii. Briefing and debriefing; training to recognise the achievement and validation of the objectives of the exercise.
  - iv. Sensitive and stressful situations; training to care for the welfare of personnel exposed to traumatic events, handling press conferences etc.
  - v. Awareness; training to recognise the different stages from aftermath to recovery.
-

## Level 3 Diploma Examinations

### Paper 1: Fire Safety

#### Question 1

- a) One category of sprinkler is the **bulb type**. What is the other general category of **sprinkler head design**? (1 mark)
- b) For normal occupancy situations, what is the recommended **operating temperature** in degrees Celsius? What is the corresponding **identifying colour** of the temperature reactive part for a sprinkler head? (2 marks)
- c) Sprinkler heads may become uncertain in their operation if the normal ambient temperature approaches too closely to the operating temperature. How is it recommended that this situation is compensated for? (3 marks)
- d) **Describe in detail** the operation of a bulb type sprinkler head. (6 marks)
- e) **Draw an annotated diagram** of the bulb type sprinkler head, labelling the main parts. (8 marks)

Successful candidates had a clear knowledge of the types of sprinklers and the comparisons that can be made, and provided good clear annotated diagrams. Unsuccessful candidates did not know the types of classifications of sprinklers, and had little understanding of the operation of a sprinkler head. Further marks were lost for poor diagrams.

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#### Question 2

With the aid of an **annotated diagram**, detail the **elements of structure** that are found within traditional buildings. (20 marks)

Generally candidates picked up good marks on this question with most providing fully annotated diagrams. Those who failed to achieve a pass did not name the structural elements in the diagram they produced or produced poor diagrams.

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#### Question 3

**Describe** the effect on the fire plume in a compartment fire where the fire is in the location specified below:-

- a) In the centre of the compartment. (4 marks)
- b) In contact with a wall.

- c) In a corner of the compartment. (4 marks)
- d) In contact with the ceiling. (4 marks)
- (8 marks)

On the whole this question was quite well answered by the majority of candidates attempting it. Those who achieved good marks did so by explaining why oxygen entrainment caused the flame length to vary in the different locations. More marks were available for part d) because the formation of a smoke layer added an extra degree of complexity to the answer.

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#### Question 4

*Fixed installations using carbon dioxide are used to extinguish fires occurring in a variety of risks.*

- a) **Outline** the limitations of carbon dioxide as an extinguishing agent. (10 marks)
- b) What are the **main factors** that determine the type of installation and the amount of carbon dioxide for the installation? (5 marks)
- c) **List** five types of risk for which carbon dioxide fixed installations can be used satisfactorily. (5 marks)

Candidates attempting this question generally submitted good answers. Most candidates understood that the limitations of carbon dioxide included dispersal by currents of air and its unsuitability where materials are involved that contain their own oxygen supply. Part c) involved consideration of the advantages of using carbon dioxide over other extinguishing media, hence its installation where electrical apparatus, chemicals and libraries etc. needed protection.

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#### Question 5

- a) **Explain fully** what is meant by the terms **inherent** and **added** in relation to the fire resistant qualities of building materials. (6 marks)
- b) **Specify** the four principal factors upon which the stability of a brick wall depends. (4 marks)
- c) **List** the six principal reasons for the collapse of walls in fires. (6 marks)
- d) With the aid of an **annotated sketch, illustrate** how the load on a wall of a multi-floor building should be concentrated to ensure stability. (4 marks)

This question was popular with candidates and generally it was answered well. Distinguishing between **inherent** and **added** qualities and identifying four stability factors gave candidates no problems. Candidates were tested a little more by the reasons for the collapse of brick walls. The annotated sketch can be found in The Fire Service Manual Volume 3 which also contains the other information necessary to answer this question. Those candidates who had studied the appropriate sources therefore found this a straightforward question to answer.

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#### Question 6

- a) **Name and define** the principal loads on a building. (6 marks)
- b) **Identify** which of the principal loads are **constant** and which are **variable**. (3 marks)
- c) **List** the three reasons why steel is used as the reinforcement in reinforced concrete. (3 marks)
- d) **Describe in detail** the two methods of pre-stressing concrete. (8 marks)

This was a traditional style question which most candidates answered well. Some candidates made good use of diagrams in part d) to enhance their answers. The unsuccessful candidates tended to gain a few marks on parts a) and b) but did not have a sufficiently deep enough understanding of reinforcement and pre-stressing to achieve a pass.

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#### Question 7

- a) In relation to **automatic fire detection**, give the **definition** of the term **detector**. (6 marks)
- b) **List** the main types of **automatic fire detectors** that are installed in buildings. (6 marks)
- c) **Detail** the **specific fire conditions** in which each type of detector is designed to operate. (8 marks)

Successful candidates showed clear understanding of the design, use and operating principle of detectors. Unsuccessful candidates showed some knowledge of detectors, but either they did not know or they misunderstood the conditions for best use.

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#### Question 8

- a) **Identify and outline** the five classes of fire.

(10 marks)

- b) **List** the information that can be found permanently stamped on the body of the cylinder of a carbon dioxide type hand portable fire extinguisher.

(10 marks)

The majority of candidates gave good answers for part a) and demonstrated detailed knowledge about the five classes of fire. Worryingly, a minority of candidates misunderstood what constituted the classes of fire. For the most part, differentiation in the answers to part b) decided whether or not candidates were awarded pass level marks for this question as a whole. Candidates could either list all the information stamped on the extinguisher cylinder or had almost no knowledge at all about this subject.

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### Question 9

- List and explain** the factors that should be taken into account when calculating the time for escape from a building in a fire situation.

(20 marks)

Successful candidates were able not only to list the factors to be considered when calculating the time for escape, but also to explain the reason(s) for taking each one into account. Unsuccessful candidates relied on operational experience alone rather than complement it with detailed information acquired from the appropriate sources.

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### Question 10

- a) **List** the two principal categories of **fire damper** that are fitted to air conditioning or ventilation ducts.

(4 marks)

- b) **Explain in detail** the construction and method of operation of one example of fire damper from each category.

(16 marks)

Marks were awarded to candidates who demonstrated their awareness of the principal categories and were also able to explain their construction and operation in detail. Candidates who failed to pick up good marks did not understand what was required from the question and discussed AIRCON and filtering systems in general.

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## Paper 2a: Operations - International

### Question 1

*You are the officer in charge of the first attendance and you are called to a derailment involving a passenger train in a rural location.*

**Discuss** the factors you need to consider, with particular emphasis on **scene safety** and **operations**.

(20 marks)

Candidates achieved good marks where it was obvious they had read the relevant material and applied it to the question. Those who showed that they had basic scene safety awareness attracted good marks. They demonstrated this by identifying the risks to passengers and to firefighters and by focusing on effective operations such as using the Incident Command Structure and multi-agency working. Candidates lost marks when they focused on the welfare and rescue of the casualties, and tended to show very little awareness of the ICS and basic Personal Protective Equipment issues.

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### **Question 2**

*You are the officer in charge at an incident where a military aircraft has made a forced landing on farmland. The aircraft is intact and the pilot is conscious.*

- a) *What is your assessment of the dangers this situation presents?* (10 marks)
- b) *How would you rescue the pilot and maintain the safety of your crew?* (10 marks)

Successful candidates identified potential hazards on the aircraft including fuel, munitions, and explosives. Unsuccessful candidates tended to generalise potential hazards and focused on farmland issues, which attracted minimal marks. These candidates also showed little awareness of miniature detonating cords (MDC), chaff and flare dispensers. Overall, candidates failed to recognise the importance of dynamic risk assessment.

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### **Question 3**

*You are the officer in charge at a fire in a large warehouse constructed of sandwich panels.*

**Discuss** *the impact of sandwich panels on firefighting operations at buildings constructed with these materials.* (20 marks)

Candidates who attempted this question and were awarded high marks for it had a good understanding of sandwich panels, although they appeared to be in a minority. Most candidates did not fully understand the fire behaviour associated with sandwich panels and made general assumptions about smoke, heat and so on.

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### **Question 4**

*You are designated the **water officer** at a large industrial fire. You are using several different sources to supply water to the site of the incident.*

- a) **Describe in detail the symptoms** *of faults that may occur:-*
- i. *When working from a pressure-fed supply.* (5 marks)
- ii. *When working from open water.*

(5 marks)

b) **State the principles** to be observed when controlling pump output where firefighting jets and hand-held branches are in use.

(5 marks)

c) What are the benefits and disadvantages of automatic pump controls?

(5 marks)

It appeared that successful candidates were good pump operators, who understood the principles involved and consequently they answered the question well. Part a) required a basic understanding of diagnostic fault-finding. Overall parts b) and c) were not so well answered by the majority of candidates.

Unsuccessful candidates struggled with this question as it appeared they attempted it as a last resort.

---

### Question 5

You are the sector commander working and operating at the rear of an incident. You have requested a **turntable ladder** to effect rescue and firefighting.

a) With the aid of an **annotated diagram**, show how the following considerations should be taken into account.

**N.B.** Please include **detailed captions** (not simple labels) with the diagram.

- i. Safety limitations
- ii. Siting
- iii. Clearance
- iv. State of ground

(7 marks)

b) With the aid of a **flow chart**, detail and explain a **standard operating sequence** for setting up a turntable ladder ready for use.

(7 marks)

c) In relation to the **make up phase** of the turntable ladder, list the stages you would expect in a **standard operating make up sequence**.

(6 marks)

Few candidates attempted this question, and very few of them were successful. Those who attracted good marks were familiar with the turntable ladder, but it appeared that many candidates were writing everything they knew about ladders in general, little of which was relevant to the question. The annotated diagram and the flow chart were generally poorly executed.

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### Question 6

As the officer in charge of the first attending appliances at an industrial building with reports of a fire, you discover there are significant dust and powders which pose a risk to firefighters.

- a) **Describe** briefly the risks that can be associated with dust and powders. (5 marks)
- b) **Discuss the actions** you would take to mitigate the dangers in this situation and to deal effectively with the incident. (15 marks)

Successful candidates produced some excellent scripts which attracted very good marks. These candidates demonstrated their knowledge about dust and powders, and showed they understood how to treat the dangers with sprays, jets and foam. Unfortunately some candidates failed to acquire marks when they **listed** points rather than **discussed** the relative effectiveness of the actions they would take. They also lacked understanding about how dust and powders react.

---

### Question 7

*Industrial radioactive sources are becoming more prevalent and represent risk to firefighters and the environment.*

- a) **Outline the actions** you would consider if you were the officer in charge of the initial attendance at a fire involving these materials. (12 marks)
- b) **List** typical places where radioactive sources may be encountered. (8 marks)

Successful candidates answered the question in a structured way and gained good marks for part b) which required a straightforward list. Unsuccessful candidates often offered bullet point lists of generic terminology e.g. *personal protective equipment*, and *shielding* without detailing and explaining the actions to be considered by the officer in charge. Most candidates who attempted this question achieved a pass level mark for it.

---

### Question 8

*When acetylene cylinders are involved in a fire they pose significant risks to firefighters.*

- a) **Detail** the properties of acetylene. (10 marks)
- b) **Explain** the actions you would take to resolve an incident involving acetylene cylinders. (10 marks)

Candidates who understood the full properties of acetylene including the flammable range of the substance attracted high marks. Unsuccessful candidates appeared to know very little about acetylene, for example whether it is flammable or explosive as well. Some candidates tried to use the chemical formulae in their answers but this attracted no marks simply because it did not feature in the question asked.

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### Question 9

*Building collapse is a significant danger at severe fires.*

- a) **Detail the signs of collapse** in buildings of traditional construction.

(12 marks)

- b) **Explain in detail** the signs indicating the collapse or the possible failure of pre-stressed and post-stressed concrete that is found in modern buildings.

(8 marks)

This was a popular question because it appeared to be a straightforward one that allowed candidates to earn high marks quite easily. Successful candidates read the question carefully and showed a high level of understanding of pre-stressed and post-stressed concrete. Unsuccessful candidates used bullet point lists to itemise the signs of collapse, ignoring the key trigger word **detail** in both parts of the question.

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### Question 10

*As the officer in charge of the incident, you have responded to a large fire involving farm buildings.*

- a) *What risks to the safety of your firefighters would you expect to find inside and adjacent to the farm buildings? **Discuss** these in detail.*

(10 marks)

- b) **Explain** the actions you would take to reduce or mitigate the dangers to your firefighters.

(10 marks)

High scoring answers to part a) highlighted the potential risks of fires in farm buildings, including their design and possible collapse, pesticides, fertilisers and the animals present. Unsuccessful candidates failed to read the question carefully, or failed to mention the risks posed and focused on the actions instead. Very few candidates mentioned zoonoses - diseases transmitted from animals to humans.

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## **Paper 2c: Aero Fire Studies**

### Question 1

*Incidents involving undercarriage assemblies such as wheel fires and hot brakes present particular hazards to members of the **airport rescue and fire-fighting service** (ARFFS).*

- a) **Explain** what these hazards are.

(12 marks)

- b) **Describe** the techniques used to deal with these incidents.

(8 marks)

The majority of candidates demonstrated a good knowledge of the hazards arising from wheel fires and hot brakes and the techniques for dealing with these incidents. Generally, candidates attempting this question produced detailed answers and were successful. However the majority of candidates did fail to mention the potential for heat transfer to the fuselage and the need to commit personnel to the inside of the aircraft to monitor the signs of heat.

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### Question 2

- a) **List** the aviation fuels in common use and **outline** the methods of dealing with aviation fuel fires. (11 marks)
- b) **Produce a table** illustrating the physical properties of the commonly used aviation fuels. (9 marks)

Part a) was answered very well with the majority of candidates achieving high marks by successfully detailing the methods of dealing with aviation fuel fires. Part b) was not so well answered although those possessing the necessary scientific knowledge achieved high marks. Curiously, a number of candidates omitted to answer the second half of part a) in outlining the methods of dealing with aviation fuel fires. In fact this was a straightforward question to answer and it was surprising that a number of candidates failed to get a pass level mark in what should have been a routine matter.

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### Question 3

- a) **Detail** the sequence for effecting a rescue from a **military fighter aircraft**. (12 marks)
- b) **Draw** any four symbols used to identify the **various systems** in military aircraft. (8 marks)

Part a) was particularly well answered with the majority of candidates achieving a pass level mark by demonstrating the required knowledge and understanding of the sequence involved. Part b) was also well answered by candidates who read the question carefully and answered it directly. There appeared to be a gulf between candidates who scored highly and those who scored very few marks. In the latter case it appeared their answers contained more guesswork than any sound knowledge of the subject, including what appeared to be invented “symbols” in the hope of securing some marks.

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### Question 4

- a) **List** the different types of **composite materials** (also known as **man made mineral fibres** or MMMFs) used in aircraft construction. (8 marks)

- b) **Describe** methods of reducing the risk to **airport rescue and fire-fighting service personnel (ARFFS)** from the effects of MMMFs at the scene of an aircraft incident.

(12 marks)

Successful candidates were able to list the older MMMF's in use but no candidate mentioned GLARE, (glass reinforced laminate - a newer material in use,) about which information is widely available. The majority of candidates provided insufficient information when answering part b), which carried the majority of the marks available. This resulted in fewer candidates than expected achieving a high mark for the question as a whole.

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### Question 5

**List and explain in detail** the types of emergency to which the **airport rescue and fire-fighting services (ARFFS)** may be required to attend.

(20 marks)

This question was generally very well answered with most candidates being successful. The subject matter was well known to most candidates who had no difficulty in listing and detailing the standard eight types of emergency. Marks were also awarded where it was evident from the scripts that some airports legitimately respond to types of emergency outside the conventionally accepted list.

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### Question 6

- a) **Define** the term **Standby Point(s)** and **explain** their purpose. (5 marks)
- b)
- i. **Explain** the purpose of a **Rendezvous Point (RVP)**.
  - ii. **How** should it operate in an emergency?
  - iii. **What** types of equipment may be found at a **Rendezvous Point**?

(15 marks)

This was a popular question, with the majority of candidates submitting good answers. Unfortunately some candidates were unable to provide clear definitions and showed confusion in differentiating between standby and rendezvous points. Others gave rambling lists of equipment, which failed to attract many of the marks available in part b) iii.

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### Question 7

**Discuss** the role of the **airport rescue and fire-fighting service (ARFFS)** with regard to **post-incident investigations**.

(20 marks)

Successful candidates showed a detailed knowledge of the 'do's' and 'don'ts' of investigations, demonstrating that they could think through the procedure and produce detailed, logical scripts. Marks were lost by "listing" rather than "discussing" the role of the ARFFS as a number of their actions are influenced by the need to preserve the scene and keep the evidence intact. As they also assume responsibility for initial accident site security their role cannot adequately be summarised by a list of bullet points. Unfortunately a number of candidates provided line after line of irrelevant information that did not attract any marks.

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### Question 8

**Identify and describe** the factors that should be considered by officers in charge of airport rescue and fire-fighting services during the following phases of an aircraft incident.

- i. *En route.*
- ii. *On arrival.*
- iii. *Closing down.*

(20 marks)

This was not a popular question and it was ignored by all but very few candidates. Those who attempted it however provided good detailed answers that focused on the following:-

- i. Pre-planning and regular training for the first phase.
- ii. Briefing and liaison with other agencies followed by prompt and effective deployment in the second phase.
- iii. Although the emergency phase absorbs the majority of ARFFS activities, enquiries, investigations, debriefing and evaluation will involve them too.

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### Question 9

**Detail the response objectives** of the airport rescue and fire-fighting service (ARFFS) as determined by the relevant **civil aviation document**.

(20 marks)

Very few candidates achieved good marks with this question as most appear to have misread it. Although many candidates provided detailed answers, unfortunately the information they provided was not relevant to the question.

The relevant civil aviation document commits the ARFFS to respond as quickly as possible to incidents. It sets response times according to the size of the airport, the location of fire stations and the disposition of personnel and vehicles.

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### Question 10

*In cases where airports are located near large expanses of water, discuss the provisions to deal with incidents where aircraft crash into, or are forced to land upon, the water.*

(20 marks)

This was a popular question that was answered very well on the whole by those candidates attempting it. Answers often included some novel ideas which (where relevant and appropriate,) were rewarded with marks. Essentially, good answers focused on the following points:-

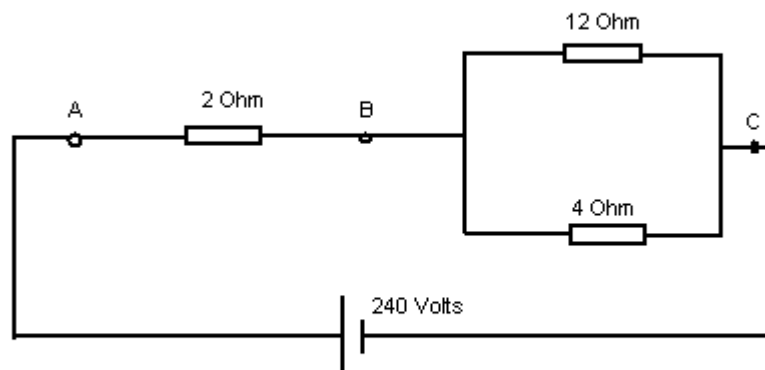
- i. Including special arrangements within the airport's emergency plan.
  - ii. Provision of special equipment and the training of personnel.
  - iii. Water rescue of casualties – including diving teams.
  - iv. Environmental considerations such as dealing with fuel on the water surface.
- 

### **Paper 3: Fire Engineering Science**

#### **Question 1**

For the circuit shown **calculate** the following:-

- a) The current flowing from the source (5 marks)
- b) The voltage drop across AB (5 marks)
- c) The current in the 12 Ohm resistor (5 marks)
- d) The power dissipated in the 12 Ohm resistor (5 marks)



Successful candidates used and applied Ohm's Law to calculate the answers requested. Unfortunately other candidates failed to understand the calculation involved with parallel and series circuits.

---

## Question 2

A steel beam resting on a fulcrum point has two loads on one side. One load is 1kN and is 5 metres from the fulcrum. The other is 2.2 kN and is 3.5 metres from the fulcrum.

A water container measuring 4 metres by 4 metres and 1 metre deep is placed on the other side of the beam with its closest edge 6 metres from the fulcrum.

- a) **Draw a diagram** to illustrate these loads. (5 marks)
- b) What **weight of water** must be introduced into the water container in order to balance the beam in equilibrium? (6 marks)
- c) If the water container is leaking at 60 litres per minute, how long will it take to get the beam in equilibrium if a 12.5 mm diameter nozzle with 2 bar nozzle pressure is filling it? (9 marks)
- (N. B. Assume the water container has no significant weight.)

Candidates who provided a clean diagram with the correct measurements and loads, and who also understood the calculations involved with moments and levels scored good marks. Candidates tended to lose marks when they provided poor diagrams, or failed to understand the calculations required relating to moments and levels.

---

## Question 3

**Briefly define** each of the following terms:-

- a) *Exothermic reaction* (2 marks)
- b) *Molecule* (2 marks)
- c) *Polymer* (2 marks)
- d) *Physical explosion* (2 marks)
- e) *Viscosity* (2 marks)
- f) *Oxidisation* (2 marks)
- g) *Calorie* (2 marks)
- h) *Inert gas* (2 marks)
- i) *Aliphatic hydrocarbons* (2 marks)
- j) *Kinetic energy* (2 marks)

Successful candidates were fully conversant with the chemical and scientific definitions of the terms listed, where unsuccessful candidates were unable to define the terms adequately.

---

#### Question 4

- a)
- i. With reference to **tank fire fighting** explain the term **sloperover**. (2 marks)
  - ii. What are the **causes** of a **sloperover**? (4 marks)
  - iii. What are the **warning signs** of a **sloperover**? (4 marks)
- b)
- i. With reference to **tank fire fighting** explain the term **boilover**. (4 marks)
  - ii. What **three conditions** must exist simultaneously for a **boilover** to occur? (3 marks)
  - iii. What can be done to prevent a **boilover**? (3 marks)

Good marks were awarded to candidates who understood the principles and terms involved in tank fire fighting. Unsuccessful candidates did not understand the principle of the heat wave travelling down the tank and reacting with the water at the bottom.

---

#### Question 5

- a)
- i. **Draw an annotated diagram** of a **simple ionisation detector**. **Label** the main parts and important features. (5 marks)
  - ii. **Describe** how an **ionisation detector** works. (3 marks)
  - iii. What is the **advantage** of an **ionisation detector**? (2 marks)
- b)
- i. **Draw an annotated diagram** of an **optical smoke detector (light scatter type)** in the **fire condition**. **Label** the main parts and important features. (5 marks)
  - ii. **Describe** how an **optical detector (light scatter type)** works. (3 marks)
  - iii. What is the **advantage** of an **optical detector (light scatter type)**? (2 marks)

Successful candidates provided clear and correctly annotated diagrams. They also understood the actuation process of both ionisation and optical smoke detectors.

Unsuccessful candidates provided poor diagrams and did not appear to understand the operation of both the ionisation and the optical smoke detectors.

---

### Question 6

- a) **List** three factors that effect the duration of breathing apparatus worn at incidents. (3 marks)
- b)
- i. **Define Charles' Law.** (4 marks)
- ii. **List** the other two laws that make up the **General Gas Law** also known as the **Combined Gas Law.** (2 marks)
- c)
- i. A breathing apparatus cylinder has a pressure of 204 bar(s) and a water volume of 8 litres. **Calculate** the maximum amount of air in the cylinder at this pressure. (Show all formulae and all calculations in your answer.) (2 marks)
- ii. A breathing apparatus cylinder has a pressure of 180 bar(s) at 21°C. If the pressure in the cylinder rises to 204 bar(s), **calculate** the temperature of the air. (Give the answer in degrees Celsius and show all formulae and all calculations.) (9 marks)

Candidates were awarded marks where they knew the factors affecting a breathing apparatus set, knew the definition of Charles' Law, and had the ability to apply Charles' Law to a working scenario. Candidates failed to pick up marks for not stating the factors effecting the duration of a breathing apparatus set, for not being able to calculate the amount of air in a cylinder, did not know Charles' Law, and were unable to apply Kelvin to the calculator.

---

### Question 7

- a) **Describe** Newton's **Laws of Motion.** (12 marks)
- b) **List** the equations and **calculate** the momentum and kinetic energy of a 2,400 kg vehicle with a velocity of 12 metres per second ( $m/s^{-1}$ ). Show the correct units in your answer for full marks. (8 marks)

To gain a pass in this question, candidates needed to show that they had a sound understanding of Newton's Law of Motion. Extra marks were then awarded to candidates who went on to apply the formula for momentum and kinetic energy. Candidates were not successful in this question where they failed to understand the Laws of Motion in the first instance.

---

### Question 8

- a) **Define the term *specific heat capacity*.** (3 marks)
- b) **Define the term *latent heat of vaporisation*.** (3 marks)
- c) **The *heat absorbing capacity* of a material depends upon which **two factors**?** (4 marks)
- d) **How much *heat energy* is required to convert 2.2 kg of water at 2°C to steam at 100°C?** (10 marks)

(SHC of water is  $4180 \text{ J kg}^{-1} \text{ K}^{-1}$ . Specific latent heat of vaporisation of water is  $2260 \text{ kJ kg}^{-1}$ )

Successful candidates knew the precise definitions of *specific heat capacity* and *latent heat of vaporisation*. Candidates lost marks when they failed to give precise definitions for parts a) and b) and they also omitted the formula for heat energy.

---

### Question 9

- a) **Describe the following metals in terms of their *reactivity*, *valency* and *position in the periodic table of elements*:-**
- Sodium.
  - Magnesium.
  - Aluminium.
- (9 marks)
- b) **Briefly describe the reaction of these metals with water.** (5 marks)
- c) **Write *balanced chemical equations* for the following two reactions:-**
- Sodium with water
  - Aluminium with steam.
- (6 marks)

Candidates gained high marks for showing their knowledge about metals and their reactivity and valency. Those who attempted to balance the chemical equations also gave good answers that enabled them to achieve a pass level mark. The reaction of the named metals with water was not generally addressed.

---

### Question 10

A trunk main 1.2 m in diameter has ruptured (i.e. broken,) resulting in the flooding of a small village. Surveyors estimate that 1,000,500 litres of water have already escaped and entered the village. The trunk main is shut off 10.5 km from the rupture (or break).

The following equipment is being used to pump the water away:-

- i. Two light portable pumps, with each one having two delivery hose lines out terminating in 20 mm diameter nozzles working at 4 bar nozzle pressure.
- ii. One major pump with three delivery hose lines out, each terminating in a 25 mm diameter nozzle working at 6 bar nozzle pressure.
- iii. One high volume pump using 150 mm diameter hose which is open ended and discharging at a pressure of 1.5 bar.

Assuming the rest of the trunk main empties and no water soaks away, how long will it take to remove all of the leaked water using the pumps and equipment specified above?

(20 marks)

Successful candidates read the question thoroughly, and used the number of deliveries quoted in their calculations. They also applied the correct formula for nozzle discharge. Unfortunately many candidates failed to read the question thoroughly and failed to make use of the information given. They failed to calculate the volume of the trunk main and add it to the volume of water that had already escaped. They also failed to include the number of deliveries in the calculations, and appeared not to know the correct formula for nozzle discharge.

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## **Paper 4: Human Resource Management - International**

### Question 1

**Describe** the preventive actions and **safety precedence sequence** that can be used to avoid accidents and reduce risks during practical training sessions.

(20 marks)

Successful candidates had carefully read the question and were therefore able to apply their knowledge in answering it. In general this question was fairly well answered, as most candidates recognised the thrust of this question was 'health and safety'. This involved using their knowledge of preventive actions and the safety precedence sequence in the context of the practical training sessions. Unsuccessful candidates failed to recognise the purpose of the question and as a result often wrote about the organisation of training sessions without demonstrating any recognition of the health and safety implications.

---

### Question 2

- a) **Identify** the constituent parts of a **performance management framework**.

(8 marks)

- b) **Describe** the types of records that aid performance management processes.

(12 marks)

In general this question was answered well with candidates demonstrating a good knowledge of performance management processes and the types of records involved. Even some of the poorer scripts managed to identify some of the record systems, although unsuccessful candidates tended to write about a different topic of which they had some knowledge, irrespective of its relevance to the question set.

---

### Question 3

**Describe** the key considerations for managers in preparing and delivering effective presentations to their teams.

(20 marks)

In answering this question, the majority of candidates demonstrated a good level of knowledge about the factors which need to be taken into account. In the main the candidates who failed to gain sufficient marks to achieve a pass were on the right track but wrote too generally or too briefly or they focused on too limited a range of factors.

---

### Question 4

- a) **Explain** why it is important to undertake **continuing professional development** (or CPD).

(10 marks)

- b) **Explain** why it is important to have a written personal development plan.

(10 marks)

Overall this was a well answered question, with successful candidates demonstrating a good understanding of CPD and the role of personal development plans in supporting the CPD process. Unsuccessful candidates showed some understanding of the importance of CPD but did not mobilise enough information on personal development plans to obtain a pass mark.

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### Question 5

- a) **Explain the benefits** of developing productive working relationships with colleagues in your organisation and external partners.

(8 marks)

- b) **Describe the factors** that can help to develop productive working relationships between different parts of the same organisation and with external organisations.

(12 marks)

Successful candidates fully appreciated the benefits of developing and maintaining good working relationships with both internal and external partners, and they were able to articulate the positive outcomes these can bring to an organisation. Unsuccessful candidates displayed a lack of knowledge about the benefits, or failed to write sufficient relevant detail to achieve a pass mark.

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#### **Question 6**

- a) **Explain** the importance of **Human Resource Planning** to an organisation.

(5 marks)

- b) **Describe** the factors that organisations need to take into account as part of their **Human Resource Planning** process.

(15 marks)

Good marks were awarded to candidates who clearly understood the role of human resource planning and were able to identify and discuss the factors involved. Unsuccessful candidates appeared to have responded to the phrase 'human resource' and ignored the 'planning' aspect of the question. This caused them to write at great length about recruitment and selection which was not what the question required of them.

---

#### **Question 7**

**Describe the ways in which** managers can improve their **personal effectiveness** in order to maximise the contribution they make to the achievement of **organisational objectives**.

(20 marks)

Successful candidates recognised that managers have to respond to competing claims upon their time. They also have to balance a range of responsibilities and identify the ways in which they are being productive. Unsuccessful candidates tended to write at great length about motivation theories. This led them to focus only on the "soft skills" of management, without directly addressing the question asked.

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#### **Question 8**

**Conflict** within the workplace can occur for many reasons and when disputes arise they can easily become unmanageable. **Mediation** can be used in some cases to resolve these differences.

- a) **Outline** the role of a **mediator**.

(3 marks)

- b) **Describe** the processes involved in **mediation**.

(6 marks)

- c) **Describe** the benefits of effective mediation to the organisation.

(11 marks)

Marks were awarded to candidates who clearly understood the role of the mediator, what the process of mediation involved and the benefits that successful mediation brings. Candidates who failed to gain enough marks to achieve a pass level saw the role of the mediator as **settling a dispute** rather than **enabling the warring factions to find their own way forward**. However all candidates managed to identify some benefits of mediation in one way or another.

---

### Question 9

*Most managers at some stage in their career will be called upon to carry out an investigation of some sort.*

**Explain** how to carry out an investigation requiring the collection and validation of information. For example, this may involve a complaint, a disciplinary investigation, a grievance, or a health and safety investigation.

(20 marks)

Successful candidates clearly understood and identified the steps in the investigatory process. Unsuccessful candidates often ignored the emphasis on the process and wrote about the stages in a disciplinary procedure, or a grievance procedure, or even about the causes of accidents.

---

### Question 10

a) **Explain** what is understood by the term **Management Information Systems**.

(6 marks)

b) **Describe** how they can contribute to **organisational effectiveness**.

(14 marks)

Successful candidates showed that they understood what a management information system is and how organisations use the information that is produced by the processing of different types of data. Candidates who failed to achieve enough marks for a pass failed to read the question properly and wrote instead about knowledge management or the factors to be taken into account in setting up a management information system.

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## Paper 5: UK Operations

### Question 1

a) **Discuss** the purpose of pre-planning for incidents at large sports stadia.

(12 marks)

b) With regard to incidents at large sports stadia, **explain** the value of specific command references for officers, including **Sector Command procedures**.

(8 marks)

Successful candidates were able to explain the purpose and expand on the activities in the pre-planning stage (e.g. visits, exercises, station lectures). This was also helped by candidates highlighting information required in the pre-planning stage e.g. R.V., access/egress, water supplies, and fixed installations. However many candidates failed to read the question correctly and explained what they would do at an incident as the incident commander. Many candidates also failed to name the roles of the functional officers.

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### **Question 2**

- a) **Detail** the different properties of foams and foam concentrates used in firefighting. (10 marks)
- b) **Classify** foams by expansion rates. (3 marks)
- c) **Draw an annotated diagram** of a hand-held foam branch. (7 marks)

Successful candidates were able to detail protein based foams and synthetic based foams (P, FP, FFFP/SYNDET, AFFF). They were also able to name the three expansion rates. There were some excellent annotated diagrams of hand held foam branches, and consequently good marks were awarded in these cases. However, many candidates failed to demonstrate a full and complete knowledge of this subject, and reverted to personal experience rather than include the specific information required. Many also did not understand expansion rates or the workings of a foam branch.

---

### **Question 3**

*When acetylene cylinders are involved in a fire they pose significant risks to firefighters.*

- a) **Detail** the properties of acetylene. (10 marks)
- b) **Explain** the actions you would take to resolve an incident involving acetylene cylinders. (10 marks)

Many candidates were able to give very comprehensive answers to this question, including the flammability range of acetylene. High marks were awarded to candidates who articulated safe and effective ways of resolving the incident which included using a 200m cordon and thermal cameras. Unsuccessful candidates tended to guess at the properties, with several stating that they would place the cylinder in a dam with a safe zone of only 100m. These are safety critical elements that all candidates should understand.

---

#### Question 4

- a) **Describe** the impact that fire and firefighting media can have upon the environment. (12 marks)
- b) **Discuss** the effectiveness of control measures that can be used to limit the environmental damage caused by fires. (8 marks)

Some candidates gave excellent answers that focused on surface water, ground water, and the effects on ecosystems, plants, animals and marine life. Only a few candidates were able to name the hierarchy 1-5, which is as follows: contain at source; contain close to source; containment on the surface; contain in the drainage system; and contain in the water course. Many candidates failed to gain marks as a result of targeting smoke as the main issue. They also failed to understand the impact on the environment by firefighting operations both long term and short term.

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#### Question 5

- a) In relation to firefighting, **outline and explain** the following terms:
- i) **Positive ventilation**
  - ii) **Negative ventilation**
- (10 marks)
- b) **Discuss** the advantages and disadvantages of employing **tactical ventilation** at incidents. (10 marks)

Many candidates were able to answer this question well, showing a full and complete knowledge of the subject and contextualising it with diagrams. However many candidates confused natural ventilation with positive/negative ventilation and wasted time on drawings of high rise buildings. Many were not able to discuss tactical ventilation and its usefulness in assisting with escape, improving visibility, reducing smoke, and restricting the spread of fire.

---

#### Question 6

*Building collapse is a significant danger at severe fires.*

- a) **Detail the signs of collapse** in buildings of traditional construction. (12 marks)
- b) **Explain in detail** the signs indicating the collapse or the possible failure of pre-stressed and post-stressed concrete that is found in modern buildings. (8 marks)

Successful candidates scored highly on this question naming cracked arches, spalling, sagging floors and the displacement of steel or cast iron pillars. They also provided an

explanation for each point, and some provided diagrams to support their explanations or to indicate other signs of collapse. However many unsuccessful candidates used bullet points to indicate signs of collapse but included no explanations to go with them. With some candidates, many of the points they made were neither credible nor operated within the boundaries of common sense.

---

### Question 7

You are the incident commander at an incident involving the rescue of a casualty from a large tower crane. The operator has collapsed and requires removing safely to ground level where medical services can give appropriate treatment.

With particular reference to **safe systems of work**, discuss in detail the following:-

- i. The actions you would take to resolve this incident successfully.
- ii. The reasons for the actions you would take in resolving this incident.

(20 marks)

Many candidates answered this question well by working through the issues from pre-incident information, through hazards and risks to control measures, including taking weather conditions into account. Consideration of safe person / safe process issues, and naming issues within the dynamic risk assessment (supervision, comms, access, egress etc) were also a requirement. However unsuccessful candidates did not approach this question in the right manner, merely stating what the decisions would be in relation to the rescue instead of including discussion of the risks, the hazards and the relevant legislation.

---

### Question 8

- a)
  - i. **Outline** the factors you would consider if you were the incident commander of the first attendance at a fire involving industrial radioactive sources.

- ii. **How** would these considerations shape your actions?

(12 marks)

- b) **List** the typical sites where radioactive sources may be encountered.

(8 marks)

Successful candidates were able to outline the factors in concise detail, highlighting their proposed actions as they did so. These factors involved consideration of time, distance and shielding, specialist equipment, types of source, dose rates and control. Unsuccessful candidates could not identify the risks of and control measures for radiation, and generally demonstrated little knowledge of this subject.

---

### Question 9

*As the incident commander of the first attending appliances at an industrial building with reports of a fire, you discover there are significant dust and powders which pose a risk to fire fighters.*

- a) **Describe** briefly the dangers that can be associated with dust and powders.

(5 marks)

- b) **Discuss the actions** you would take to mitigate the dangers in this situation and to deal effectively with the incident.

(15 marks)

Many candidates had a good grasp of the issues, risks and control measures needed to deal with this type of incident. They discussed using ventilation systems to help remove dust, thus reducing the risk of explosion. However candidates who did not gain adequate marks relied on their own experience in composing their answers rather than quote the standard answers given in relevant sources. Very few candidates could name the classes of dust.

---

### Question 10

*You are called to a large property with fire alarms activating. It is 03.00 hours in the morning and some wisps of smoke have been seen by crews.*

- a) **Explain** the legislation that is in place regarding the powers of entry and the responsibilities of fire and rescue services at this type of incident.

(10 marks)

- b) What are the **operational responsibilities** that are given to fire and rescue services under current legislation?

(10 marks)

Successful candidates were able to name and cite instances from the Fire and Rescue Services Act 2004, and the Fire (Scotland) Act 2005. Their answers were generally written to a high standard. However many candidates did not know the statute from which their current powers and responsibilities are derived. In fact they showed little knowledge and understanding of this very important piece of legislation and this was a great handicap to them in giving an informed answer.

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## **Paper 6: UK Leadership and Management - UK**

### Question 1

**Describe** the contribution that the following types of records can make to improving the management of health and safety in the workplace.

- a) Risk assessment records

(13 marks)

- b) Reports of accidents and near misses

(7 marks)

This question was popular with candidates and on the whole they answered it well. Many candidates clearly demonstrated the required knowledge and understanding on the role of risk assessment records and accident reports in the health and safety process. Less successful answers often concentrated on the process of carrying out a risk assessment without putting it into the context of the question.

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### **Question 2**

*Describe the factors that organisations take into account in order to achieve successful learning and development programmes.*

(20 marks)

Successful candidates clearly understood that a number of factors have to be taken into account to achieve successful learning and development programmes. These factors include the following:-

- i. Clearly defined organisational objectives based on learning needs.
- ii. Effective planning, resourcing and implementation of the programme.
- iii. Agreed standards and success criteria set.
- iv. Range of teaching methodologies and learning strategies adopted.

Less successful candidates wrote about the organisation of training sessions without identifying the factors required for success.

---

### **Question 3**

*Effective communication is an important aspect of all organisations.*

a) **Identify and describe five** types of communication systems which an organisation can use within the workplace.

(10 marks)

b) **Explain the benefits of upwards and lateral communication.**

(10 marks)

Candidates gaining highly marked answers clearly identified five organisational communication systems which included one-to-one conversations; seminars and presentations; staff surveys; individual or conference call telephone conversations and intranet/e-mail systems; team briefings; newsletters and the like. They also understood and explained the benefits of information moving up the organisation where staff could raise concerns or put forward ideas, enabling managers to tap into their experience and expertise. Lateral communication (perhaps in the form of interdepartmental consultation,) can promote good partnership working and prevent a “silo mentality” developing.

---

### **Question 4**

**Explain** why managers should reflect upon the quality of their leadership and their motivational and interpersonal skills.

(20 marks)

Successful candidates clearly understood and explained that leadership, motivational and interpersonal skills are an essential part of being an effective manager. They went on to explain how reflecting on these qualities enables managers to evaluate their effect on their staff and through them their effect on the successful operation of the organisation as a whole.

Unsuccessful candidates ignored the concept of reflection and wrote generally about leadership, motivational and interpersonal skills without applying their knowledge and understanding to answering the question directly.

---

### **Question 5**

- a) **Explain** why confidentiality is important in developing trust between employees and their manager.

(12 marks)

- b) **Describe** the practical steps a manager can take to safeguard confidential information and discussions.

(8 marks)

Candidates gaining good marks for their answers to this question understood that confidentiality is important in reassuring staff they will be treated with respect and dignity, and that information is only used for the purpose for which it was given. It is also important in establishing a good working relationship between managers and staff and it can prevent conflict from developing. Successful candidates also understood that practical steps to safeguarding confidentiality included secure storage of personal information, restricted access to it and privacy when conducting sensitive discussions.

Unsuccessful candidates appeared to have misread the question and wrote about “trust”, which is a completely different subject. Many unsuccessful candidates also omitted to mention that legislation underwrites the storage, retrieval and use of confidential information.

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### **Question 6**

- a) Briefly **explain** the role of **performance appraisal** in the performance management process.

(5 marks)

- b) Briefly **explain** how information is gathered for 360 degree feedback

(5 marks)

- c) **Describe** the benefits of 360 degree feedback for an employee and the organisation.

(10 marks)

Candidates who gained high marks for this question linked performance appraisal and 360 degree feedback together and described the role of each in identifying a range of objectives and development requirements. They understood the value of creating a culture where giving and receiving positive feedback is acceptable. They also knew in detail the variety of sources from which information about an appraisee is gathered.

Unsuccessful candidates simply described appraisal interviews: they understood neither the information gathering process nor the benefits of 360 degree feedback.

---

### Question 7

**Explain why it is important for a manager to develop effective *organisational skills* as well as effective *leadership skills*.**

(20 marks)

Successful candidates identified the importance of a manager's ability to develop a combination of organisational and leadership skills. These are often known as the "hard" skills (planning, controlling and co-ordinating,) and the "soft" skills (motivation and interpersonal aptitudes). The hard skills "make things happen" while the soft skills make staff more committed to the organisation.

Unsuccessful candidates tended to concentrate wholly on the softer skills of leadership and ignored the importance of organisational abilities.

---

### Question 8

a) *What are the benefits of effective **team briefings** in the workplace for the following:-*

i. *An organisation?*

ii. *An individual?*

(14 marks)

b) **Describe** the differences between an effective group and an ineffective group in relation to team briefings.

(6 marks)

The key to this question lay in recognising that the benefits of effective briefings for organisations and individuals were directly linked, so that an individual's improved morale is an integral part of increased commitment by the workforce as a whole. Similarly, a clearer understanding of an individual's role within a team can improve working relationships which in turn helps achieve the organisation's objectives. Effective groups discuss matters openly and reach a consensus while ineffective groups often repress free discussion with decisions imposed upon minorities.

Unsuccessful candidates often provided the same information for the organisation and the individual alike and did not identify the differences between effective and ineffective groups.

---

### Question 9

*All organisations have **operational risks**, which are particular to the industry in which they operate. In fire and rescue services, **effective risk assessment** is an important aspect of the role of incident commanders.*

**Describe** the factors that must be taken into account when conducting **effective risk assessments**.

(20 marks)

Candidates gaining high marks understood that this question focused on a role map and that the answer required more than a description of carrying out an effective risk assessment. Many candidates included diagrams in their answers when explaining the process involved. Information contained in the IFE resource booklet "Leadership and Management" was evidently used to good effect in the answers of successful candidates.

Unsuccessful candidates often restricted their answers to describing how to carry out a dynamic risk assessment.

---

**Question 10**

a) **Describe** the benefits of effective **team work plans** for each of the following:-

- i. *The individual*
- ii. *The team*
- iii. *The organisation*

(9 marks)

b) **Outline the processes** involved in the design, monitoring and review of **team work plans**.

(11 marks)

Good answers to this question identified clearly the advantages of team work plans for individuals, teams and organisations and recognised that many benefits were interlinked. This can be summarised as setting the team objectives to promote the organisation's priorities while motivating and giving clear briefings to individual members of staff. The processes involved included analysing tasks, prioritising objectives, problem solving and monitoring performance. Unsuccessful candidates failed to appreciate the role played by team work plans and so they were unable to identify the factors involved in the design, review and monitoring of the plans.

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