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This supplement to the September 1999 issue contains the report on the 1999 Membership and Graduateship examinations by the Chairman of the Examinations Committee, John Cowie, FIFireE who has been assisted in this task by the individual examiners' reports

REPORT ON IFE EXAMINATIONS 1999
Membership Examinations

Paper 1 – Fire Engineering Science

Question 1.1: *Water is flowing horizontally through a 250 mm diameter pipe and into a constriction of 100 mm diameter. The pressure difference between the inlet and constriction is measured as 27.5 mm of mercury. Using Bernoulli's Theorem, calculate the volume rate of flow.*

(Density of mercury = 13600 kg/m^3)
(Density of water = 1000 kg/m^3)
(g = 9.8 m/s^2)

One student attained maximum marks of 20, and several scored in the teens; it is therefore possible to answer this question well with the right preparation. For most candidates, it was like driving through an unknown area at night without a map; good start, at times completely lost, with the occasional sight of something familiar.

Bernoulli's Theorem is classed as an antidote to happiness by many; it has been included in past exams and there is no surprise that it will come around in the future.

With a choice of 6 questions from 10, candidates should attack the theorem whilst studying, or simply avoid it altogether.

Question 1.2: *Using the combustion of hydrogen as a model, describe in detail the method by which the combustion process can be terminated.*

The opening statement of this answer should have been

$$\text{Combustion of Hydrogen} = 2H_2 + O_2 = 2H_2O$$

This attracts 10% of total marks, but was missed by over half of the candidates. The branching chain reaction illustrated in 'Chemistry and Combustion' pages 177 was essential, though many candidates chose to write a narrative about the molecular reaction. There were some excellent answers from those who applied themselves to study, and maximum marks were awarded, which proves it is possible if one makes the effort. Termination processes could be demonstrated by formulae illustrating the reaction between hydrogen and bromine and similar dry powder effects.

Question 1.3: *A mixture of 50 m^3 of a gas composed of 75% butane and 25% propane is burnt within a closed room measuring 25 m x 15 m x 5 m. The only oxygen available is that within the room. If the combustion process produces 20% carbon monoxide and the remainder as carbon dioxide, calculate the final percentage concentration (by volume) of carbon monoxide within the room.*

A very poorly answered question, with only a handful of candidates achieving a pass. The answer required balanced equations for the combustion of both butane and propane resulting in the production of carbon monoxide. Using these proportions it was then a matter of solving the volumes involved based upon the size of the room. Many candidates failed to understand that the combustion process produces both carbon dioxide and carbon monoxide, and for this particular combustion process, 20% of the final product was carbon monoxide.

Question 1.4: *Discuss the fire related problems associated with the use of Large Insulated Sandwich Panels (LISPs).*

A straightforward question on a current subject area with many candidates seizing the opportunity to obtain good marks. The best scripts firstly outlined the panel construction and materials before discussing how the panels performed in fire situations. The problems with instability and combustibility needed to be addressed. Marks were also available for discussions on practical problems encountered by firefighters.

Question 1.5: *Compare and contrast different types of automatic fire detectors.*

The question required candidates to describe the differences and similarities between different types of automatic fire detectors; this was achieved by most candidates. However, many candidates wasted time by describing in detail how each type of detector operated. Very few candidates commented on the reliability, sensitivity and location of the various types of systems.

Question 1.6: *Detail the protective arrangements for the use of electrical equipment in flammable atmospheres or explosive dusts.*

This was a popular question attempted by most candidates. Good marks were obtained by those candidates who listed and detailed the types of protection employed in such environments:

1. Intrinsically safe equipment;
2. Flameproof equipment;
3. Pressurised equipment;
4. Oil/sand filled equipment;
5. Non sparking equipment;
6. Specially protected and increased safety equipment

The highest marks were achieved by those candidates who matched these equipment types to the appropriate zone, i.e. Zone 0, Zone 1 and Zone 2.

Question 1.7: *In a manufacturing environment, one area of concern is a magnesium processing section. One suggestion is to protect the area with a total flooding system. Discuss.*

This question required discussing the advantages and disadvantages of various total flooding systems, e.g. water, CO_2, N_2, halons. The general conclusion should have been that the usual total flooding systems are not suitable for reactive metals such as magnesium. Local application of a dry agent would be a more effective course of action, a conclusion that most candidates did arrive at.

Question 1.8: *The gas inside a cylinder expands as the temperature rises according to the Gas laws. The bursting pressure of the cylinder is 1000 bar and it is involved in a building fire up to a temperature of 1500°C. Allowing for the expansion of the metal, show the calculations that would be used to discover the possibility of the cylinder bursting in those circumstances.*

(Coefficient of linear expansion of cylinder metal = 0.0000012/°C)
(Volume of cylinder = 0.25 m^3 at 20°C and 250 bar)

Not a popular question, and of those who attempted it, 50% received low marks. The 'General Gas Law':

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

was very well known and the manipulation to find P_2 presented no problems. It should be noted, however, that to achieve the correct answer, V_2 has to be found, and very few candidates managed to do this:

Increase in volume

= original volume × 3x coeff. of linear expansion × rise in temp.
= 0.25 × 3 × .0000012 × (1500 – 20) m^3
= .00133 m^3

Whence, new volume, V_2 = original volume + increase; i.e. $V_2 = 0.25 + 0.00133m^3 = 0.25133\ m^3$. To prepare for this type of question, candidates should practice calculations by doing numerous examples.

Question 1.9: *Discuss the design of intrinsically safe electrical equipment in relation to inductive and capacitive sparks. Prove your answer with suitable equations.*

Most candidates who answered the question failed to describe the benefits of intrinsically safe equipment in relation to inductive and capacitive sparks. Also, only a few candidates proved their answer with the required equation: To sum up, a poorly answered question.

Question 1.10: *Describe the nature, use, hazards and the firefighting procedures associated with fats and waxes.*

For the candidates who had studied the syllabus, this was an easy question to gain good marks, and this was reflected in the standard of answers. What was looked for was an answer which gave a detailed account of the subject, clear as possible, and characteristics relative to the nature, use, hazards and firefighting procedures of fats and waxes. It was interesting to note that only **two** candidates mentioned that waxes could be used for electrical insulation.

Paper 2 – Fire Safety

Question 2.1: *Describe the structural fire safety measures for a large multi-storey shopping and commercial complex with several open levels.*

This was a poorly answered question which illustrated both a lack of understanding of the question and a general lack of preparation by most candidates. The question asked for a description of "structural" fire safety measures, it did not require in-depth scripts on smoke control, sprinklers or numbers of fire exits. Any candidate who had studied BS 5588 Part 10 needed only to have remembered the first section to have produced a satisfactory answer. Non-UK candidates who quoted similar national standards were rewarded accordingly. Finally, candidates at this level cannot merely state facts such as "the structure should be compartmented". A good answer should also state how this is achieved and to what standard.

Question 2.2: *Arson in schools is becoming an increasing problem. Discuss ways in which it may be eliminated or reduced.*

This question was generally well answered, with most candidates being able to offer constructive suggestions based on a range of priorities. Candidates needed to recognise the importance of effective security, mitigation of fire damage, post-fire recovery and the benefits of child/youth education schemes. Few candidates gave a truly comprehensive answer; most focusing on either security or child/youth education. It is clear from many responses that the current emphasis on community fire safety and the pro-active approach is having a significant effect on the perceptions and attitudes of fire officers.

Question 2.3: *Discuss in detail the provision and location of fire exit routes for a large indoor place of public entertainment.*

This question called for a discussion of the provision and location of fire exits. Many candidates offered quite irrelevant information. Few candidates were able to appreciably discuss the interrelated factors of the provision of a suitable number of doorways adequate to allow evacuation within a specified time, the distribution and optimum sizing of exits, and ease of operation of doors. This is a widely-based question, and marks would have been easy to obtain for any fire engineer able to recommend a means of escape scheme for a place of public assembly. Most UK students identified the Home Office Guide as the primary reference. Few (if any) referred to the Approved Document and the British Standard. A good mark would have been obtained by simply going through the means of escape assessment exercise that must be carried out hundreds of times a day by fire safety officers and engineers up and down the country.

Question 2.4: *Engineering services in buildings can present considerable fire related problems. Discuss in detail the measures to reduce such problems.*

This was not a popular question, attracting only 12 attempts. And again, with some basic understanding of fire safety and precautions in buildings, the imaginative candidate should have obtained an easy pass mark.

Candidates seem frightened by specific references to fire safety problems; in this case to engineering services, but the issues really aren't very complex. There were only one or two coherent descriptions linking sources of ignition and potential for fire spread with effective preventative measures.

Question 2.5: *The risk of fire in buildings is increased when 'hot working' is introduced. Discuss these risks and ways to reduce them.*

The question required candidates to discuss the problems of hot working and how to reduce the subsequent risks posed. Candidates could achieve a good mark by outlining their own organisation's policies for controlling the use of flame cutting and other heat producing equipment in the buildings. Many candidates missed logical points, e.g. that such work is often carried out by contractors unfamiliar with the building. However, the fundamental need for a permit and management policy to control these activities was generally well recognised.

Question 2.6 *a) Discuss the circumstances when the use of lifts may be used to escape from fire; and b) Detail the design requirements for such a lift.*

Most candidates showed a general understanding of the principles of using lifts to escape from fire, and appreciated that their use has to be carefully controlled, including the use of trained personnel. In Part B of the question, candidates could either outline design requirements for a specifically designed evacuation lift or a firefighters' lift. Most candidates were aware of general requirements, e.g. fire resisting construction; however, more technical items such as the need to provide ventilation in the lift shaft to avoid pressure imbalance (and therefore stopping the lift doors opening) were overlooked.

Question 2.7: *Discuss the fire safety requirements necessary for the safe operation of construction sites.*

Candidates with a good knowledge of basic fire safety could gain good marks on this question, because there are few fire safety issues related specifically to construction sites. Few candidates included reference to construction sites within buildings that continued to be used for their primary purpose. Marks were not awarded for detailed descriptions of the legislation controlling fire precautions on construction sites – anyway, not one such description was accurate. On the whole, a well answered question.

Question 2.8: *Discuss in detail the management arrangements for the effective evacuation of a residential care home.*

The key to this question was to define the relationship between structural fire precautions and evacuation procedures. The model answer would demonstrate an in-depth knowledge of fire resistance and compartmentation. This would be a major factor in the location of disabled residents, the option for horizontal and vertical evacuation, and the use of lifts in a fire situation. Other factors, such as pre-planning, risk assessment, staff training and the special needs of residents, staff and visitors, would all attract marks. In general, this question was answered rather poorly, most candidates displaying little specific knowledge of the problems common to residential homes. Most candidates applied general fire precautions and common sense. Few candidates identified the circumstances where horizontal and/or vertical evacuation were appropriate, and none were aware of recommended travel distances. The most common error was to disregard the structure of the premises and deal entirely with management systems and procedures.

Paper 3 – Fire Protection Technology

Question 3.1: *Early Suppression - Fast Response (ESFR) sprinkler systems are often incorporated into the fire protection of buildings. When considering ESFR protection, what requirements and limitations must be borne in mind?*

Very few candidates appeared aware of the limitations of ESFR as described by Factory Mutual; those who did were outside the UK. Many candidates were convinced that ESFR were for domestic use and were again unaware of the specific need for activation in high bay warehouses. Some regarded the invitation to comment on requirements as the signal to quote pipe sizes, etc. and did not address the principles behind the development of these sprinklers.

Question 3.2: *Discuss the problems of using sprinklers that are designed for life safety in large shops.*

Almost all candidates noted the effect of sprinkler spray bringing smoke levels down and possibly impeding escape. Very few were aware of the work reported recently in the IFE Journal; candidates do need to broaden their reading. Marks were given where candidates showed an understanding of the problems in large shops but in one or two cases, expected these to be those of an arsonist. The non-functioning of existing installations was a concern to some candidates, while very few recognised the importance of the fire behaviour of the items on display in the shops.

Question 3.3: *Water mist systems offer a new alternative to traditional methods of fire suppression. Describe in detail the significant potential advantages of such systems.*

Candidates should not rely totally on the Manuals of Firemanship. Many technological advances in respect of this subject are published in journals, and therefore form an integral part of the syllabus. In relation to this particular question, high marks were awarded if the student accounted for the following issues: efficiency; speed of extinguishment; availability of water supplies; environmental impact; health and safety considerations; mitigation of damage. In general, this question was answered more comfortably by the overseas candidates.

Question 3.4: *In recent years there has been increasing concern about the environmental consequences of the discharge of foam. Discuss.*

Most candidates ignored the use of foams during training, and the implications on the environment following such use, but had grasped the need to restrict the use or find replacement extinguishing agents. Very few candidates answered the question which may reflect the already restricted use of firefighting foams.

Question 3.5: *Detail the factors you would consider when giving advice for the application of a CO_2 installation.*

The question asked for advice for the application of a CO_2 installation. This required the student to list and discuss relevant factors that must be taken into consideration, not simply what happens when a CO_2 system activates. Favourable marks were awarded for scripts that took account of: suitability of such systems and building configuration; health or safety issues; properties of the fluid; description of areas where CO_2 could be used; and environmental considerations.

Question 3.6: *False alarms from fire detection equipment are an increasing problem. Discuss.*

Candidates were required to discuss this particular question, debating advantages/disadvantages, and comparing and arguing merits. In many cases, candidates focused their attention on the reasons for false alarms. Unfortunately, only a small number of marks could be awarded where the answer was restricted to this. By explaining the generic problem of false alarm calls, i.e. public safety, fire brigade loss of training time, use of reliable and accredited installers and maintenance engineers, and the cost to industry and commerce due to lost production, etc, the student was able to gain increased marks.

Question 3.7: *Explain the principal design features and advantages of the following:- a) Aspirating fire detector; b) Linear detector; c) multi-sensor detector; d) Multi-criteria detectors. The answer should include a brief description of how such detectors work, where they would be used, and the advantages of using them.*

Candidates could gain high marks on this question provided they understood the principles of design, etc. Several forgot the effect of false alarms and the need to reduce them. Very few scored low marks.

Question 3.8: *Sprinklers should be used for life safety. Discuss.*

Very few candidates scored high marks as about a third concentrated on the efficiency of domestic sprinkler systems for life safety. Some candidates specified details of the systems and stressed property and not life safety. One candidate argued cogently that other approaches had greater benefits for life safety than sprinklers. Several candidates mentioned alarms in conjunction with sprinkler actuation but neglected to outline how this would be achieved. A few insisted that visibility was improved, even though they described the way in which the cooling of the hot layer brings it down as a misty/steamy layer.

Paper 4 – Building Construction

Question 4.1: *High rise buildings must rely on their own structural features to provide fire safety. Discuss.*

With this question, many points were missed, resulting in only average marks being awarded. The building features must be regarded as the first line of defence, and firefighting second. Facilities must be built into the building to enable firefighters to reach the topmost floors, and also protect its occupants. Issues to be addressed include: compartmentation; workmanship, fire resistance of load bearing structures; smoke control; flame spread of lining materials; safe refuges. The mention of sprinklers and external wall integrity also gained marks.

Question 4.2: *What fire safety advice would you give on the use of false ceilings & elevated floors as air ducts of a mechanical ventilation system.*

This question was not popular, and very few good scripts were found. Easy marks could have been gained by mentioning national standards, smoke and fire dampers, IEE regulations, and pneumatic control lines for airconditioning systems. It would seem that some candidates were not aware of this accepted method of using false ceilings and elevated floors as air ducts for mechanical ventilation systems.

Question 4.3: *Describe in detail the factors that need to be considered when specifying fire resisting doors, shutters and frame-sets.*

Many candidates described in detail the actual elements of the British Standard test or similar national standard; the question was looking for factors that needed to be considered when 'specifying' fire resisting doors and shutters, etc. Marks were awarded for detailing the need to produce test evidence and documentation. Good answers included details of door ironmongery, smoke seals, glazing, etc. Regard should have been given to the situation and the environmental conditions to which the door/shutter could be exposed.

Question 4.4: *Describe the fire hazards when large single storey retail or business buildings are constructed with a steel frame and large insulated sandwich panels. (LISPs).*

Although this was a relatively topical question, very few candidates treated the subject with sufficient breadth and depth. Pass marks were achieved by those who described large insulated sandwich panels, and commented on their behaviour in fire conditions, detailing the problems associated with cavities, surface spread of flame, suspended ceilings and steel structures. Hazards to occupiers and firefighters also attracted marks.

Question 4.5: *Automatic smoke ventilation should not be used in conjunction with sprinklers. Discuss.*

This popular question on a topical subject was poorly answered, and subsequently very few gained a pass mark. The question asked the candidate to discuss the use of sprinkler systems in conjunction with automatic smoke ventilation. Scripts which analysed the effect that sprinkler operations had on smoke control or vice versa gained most marks. Additional marks could have been gained by comparing the virtues of the two systems and identifying risks which could utilise both virtues.

Question 4.6: *Define 'elements of structure' and describe in detail their functions, including the effect a fire has on them.*

This straightforward question was generally well answered with many candidates achieving high marks. However, those who did badly did so because they confused elements of structure with building materials. Those who gained highest marks did so by identifying the loads which elements of structure are subjected to, and subsequently describing the variation in those loads in a serious building fire.

Question 4.7: *Detail the points to be considered on the installation of fire ventilators in a single storey building.*

This relatively popular question was generally poorly answered with few achieving a pass mark. Those who scored well did so by detailing the purpose of ventilation, describing how ventilators work, and then considering the siting of ventilators in single storey buildings. Many candidates still underestimate the detail required at this level of examination.

Question 4.8: *Discuss in detail the problems associated with fires in buildings with steel decked roofs.*

It is expected that candidates taking the Membership examination will be well aware of how steel reacts when heated; limited marks were therefore awarded to candidates who depended on these elementary points. The examiners were looking for the broader picture to be discussed, covering the building owners expectations and safety standards of the roof; the provision of fire breaks; the effects of insulation or protective coating; consideration of environmental needs where large volumes of smoke could affect the public.

Paper 5 – Management and Administration

Question 5.1: *Define the term 'payment by results' and discuss in detail its advantages and disadvantages.*

The lowest number of attempts were recorded for this question. This was despite the question being simple and well structured in terms of the response required. A simple definition of the term 'payment by results' and a straightforward list of advantages and disadvantages would have received good marks. Those that did attempt the question and satisfied the above criteria achieved good marks. Some scripts would have benefited from better layout in terms of question/answer content. Some individuals also chose to quote theorists such as Herzbert as a guru of 'payment by results'. Although some of his views are relevant, he is not recognised as a proponent of the theory.

Question 5.2: *Larger organisations give better value for money. Discuss.*

This question was drawn from syllabus section 1.2 of the Management and Administration paper, linked into the bibliography via the Michael Armstrong book, *Management Techniques*. Despite the openness of the question, it did not prove particularly popular. Many candidates took the view that they merely needed to explain the reasoning that *biggest is best*. Candidates who referred to the three 'E's – Efficiency, Economy, Effectiveness, scored well; similarly, candidates who commented on the principles of *'Best Value'* scored well. Though the comment is made respectedly, dividends can be gained by looking at the syllabus, the bibliography and the booklist. The list was published and discussed in the September 1998 Journal *(Frankland, M.D. Management and Administration Paper. September 1998 FEJ, page 20).*

Question 5.3: *Discuss the principal areas of monitoring to ensure that an Equal Opportunities policy is effective, and its objectives have been achieved.*

A popular question which reflects the ever increasing awareness and importance of equal opportunities. Most candidates stated the importance of having an equal opportunities policy, which was an important starting point. Candidates also showed an appreciation of the basic tenets of equal opportunities policy. It was good to note that marks were achieved for comments on disability monitoring, exit interviews, staff development and harrassment monitoring. Use of flow charts could have assisted candidates in scoring higher marks, as the question was based on Margaret Penton's IFE booklet on Equal Opportunities, section on Monitoring.

Question 5.4: *In a quality based organisation, why is it cost effective to prevent rather than correct problems?*

A good response to this question was received. Most candidates understood the principles of TQM, stressing the importance of getting it right first time, every time, and the subsequent benefits. Most candidates quoted either text book examples or local examples, which resulted in good marks being awarded. Clearly, the publication and introduction of a revised bibliography had a positive effect. Candidates had either purchased the IFE book on Total Quality Management or had obtained a current management text book.

Question 5.5: *In examining a problem within an organisation, what techniques can be useful in finding the causes and identifying solutions?*

The response to this question from candidates was disappointing. Many misdirected their answers on peripheral issues; for example, appraisal systems and leadership styles, which were of little relevance. Candidates who used a particular example of a problem to illustrate their answer in general did not do too well. They became too immersed in the individual problem itself, rather than allowing general points, which would have attracted marks, to emerge. To gain high marks, candidates should address general points first, such as analytical techniques to identify and define problems, data collection to quantify problems, problem prevention, and development of solutions. To find the cause and solutions, four of the following techniques could be explained – mission statements, employing management consultants and specialist quality staff, customer questionnaires and customer care training, auditing performance indicators and quality assurance. Alternatively, a few examples of specific techniques could be explained. This was most candidates approach and included: brainstorming, Pareto charts, defect location drawing on a variety of cause and effect diagrams.

Question 5.6: *Why do organisations require a business plan and what should it include?*

The best answers were provided by candidates who clearly identified the two parts of the question. To gain full marks, it was necessary to firstly explain why a business plan was required. Driving forces such as increased financial pressure, value for money, competitive tendering, and commercial approach to support services, were hardly mentioned. Most candidates successfully linked development of objectives to address long and short term goals within available finance. They also recognised the use of the plan to deliver services in an efficient, effective and qualitative manner. The second part of the question was easily answered by identifying some of the components included in the plan. Some candidates spent time explaining how a business plan is evolved, which was not asked for in the question.

Question 5.7: *Discuss in detail the advantages and disadvantages of using computer simulations for command and control training.*

A straightforward question with approximately two-thirds of candidates obtaining a pass. Few candidates, however, took full advantage to gain very high marks. Most candidates mentioned start up, maintenance and training costs, the limited reality of computer simulations, and more effective use of resources compared to large scale exercises. Many failed to mention many of the benefits, such as hazard free, environmentally friendly, consistent and repeatable, with potential for future development. Marks were lost by not addressing all the disadvantages – dependency on the skills of a facilitator, requirement of constant updating of scenarios, and difficulty in adapting to local procedures or conditions were the most common omissions.

Question 5.8: *Should the Emergency Services be exempt from prosecution? Discuss.*

This was a wide subject area in which marks could be gained using a variety of well structured discussions. The easiest way to obtain high marks was to use the information from the Bibliography article. Candidates providing arguments for and against the given statement, did best. Marks were enhanced when examples of court cases were used, but many failed to identify the key point the case established. Candidates used different approaches, but breaching a duty of care through negligence and causing loss were key issues. Discussions of exemptions already in force in various parts of the world, such as traffic regulations and powers of entry, gained marks as did debating exemption from Health and Safety issues.

Paper 6 – Fire Service Operations

Question 6.1: *Discuss in detail the theory and use of positive pressure ventilation (PPV) equipment in fire fighting operations.*

This was a popular question for both home and overseas candidates; it was obvious from the answers that most people had read the bibliography and understood the use of PPV, hence a good pass rate was achieved.

Question 6.2: *Rescues requiring the recovering of a casualty from the cabin of a tower crane require careful and considered tactics from the Incident Commander. Discuss the general problems facing the Incident Commander and how those problems may be overcome to bring the incident to a successful conclusion.*

A very popular question earning the majority of candidates good marks. It was very clear that the bibliography had been covered, although some people decided that the **only** type of rescue that would be required is when the tower crane had collapsed. The question asked the candidate to outline general problems and how to overcome them, it was not looking for specific scenarios.

Question 6.3: *Fires in refrigerated cold stores present particular difficulties to firefighters. Detail the points which require attention at such an incident.*

Not a very well answered question. Many candidates concentrated either on general fireground considerations or fires in buildings with sandwich panels. The question was quite specific, looking for a 'planned' approach to fires in cold stores. The bibliography leads you through the process for this type of incident, from pre-planning, liaison, tactics, and the use of specialist equipment.

Question 6.4: *Discuss in detail the general safety rules to be observed by firefighters at a fire in an oil refinery.*

Although many candidates picked up some useful marks, many described specific operational considerations, rather than general safety rules.

Question 6.5: *Vehicle Mounted Data Systems are becoming more prevalent. Describe in detail why they are considered to be a valuable tool to the Incident Commander, and discuss how such a system may be configured.*

Candidates who read the article in the Journal scored well; others missed the point and began to discuss command and control issues. The question gave scope for candidates to expand on VMDS and its future applications; it was pleasing to see many did.

Question 6.6: *Fires in petrol filling stations and garages can present a number of severe problems for an Incident Commander. Describe in detail these problems and the actions to be taken.*

A very popular question with many candidates picking up good marks. The question allowed the candidate to develop a scenario, related to petrol filling stations and garages, and describe what would be faced and how to deal with it. Quite a few answers were too vague and concentrated on general incident procedures. Marks were gained when procedures related to this specific type of risk.

Question 6.7: *When dealing with fires in high rise buildings and malls, fire officers need to be aware of 'The Stack Effect'. Describe in detail 'The Stack Effect' and discuss the options that are available in terms of firefighting tactics.*

The few candidates to tackle this question showed some uncertainty as to what constitutes a stack effect. Discussion of ventilation control was similarly uncertain with many options ignored. Only one candidate recognised the need to look at the building as a whole before deciding what tactics to use.

Question 6.8: *Fires in agricultural silos present difficulties and dangers to firefighting personnel. Discuss.*

Those candidates who discussed the difficulties of dealing with fires in silos in a methodical manner gained good marks. However, a disappointing number of candidates lost marks by discussing rescue of casualties and obviously failed to read the question.

Paper 7 – Aero Fire Studies

Question 7.1: *Describe the fire precautions which should be incorporated into the building design of a new airport passenger terminal.*

This was a relatively popular question which asked candidates to **describe** fire precaution requirements in a new airport building. Those that did so and fully understood what was required, attracted good marks. Unfortunately, too many concentrated on general building layout/design, which was not asked for. Some candidates gave the general impression of lacking specific knowledge of the subject, instead relying on more general principles, which could be applied to **any** type of occupied building. Not surprisingly, these scripts did not receive good marks. Candidates taking this paper in the future must focus their answer on specific design features/fire precaution measures, which address the needs inherent in a building used exclusively for the commercial air transport business. A closer scrutiny of the bibliography will enable success in aero studies paper for those who have fully prepared themselves.

Question 7.2: *Describe the procedures and training schedules which should be in place to ensure that the response times to incidents are achieved within the pre-set standards, appropriate to your country.*

Generally a poor response to a standard question focusing upon the need to describe programmes and training schedules, relative to responding to aircraft incidents. Those candidates who did so gained good marks, but many concentrated upon giving a description of response times, details of different types of aircraft incident, or described basic training. Similarly, explanation of accessing different types of aircraft was a common answer. None of this was asked for in the question, and therefore opportunities to gain good marks were missed by many candidates. Future candidates will need to study very closely the bibliography for this paper if they hope to understand the subject, and be able to answer fully questions of this type with any degree of soundness.

Question 7.3: *Discuss in detail the important features in the design of a new fire station for an airport/aerodrome.*

A very popular question which attracted the highest number of attempts in the aero fire studies paper in 1999. Similarly, this was reflected in the large number of candidates who achieved a pass mark, compared to the lower success rate in other questions of the same paper. Common areas where candidates failed to achieve the pass level included too much information on giving a description of fire station location, access routes to runways, etc; this was not asked for. Specifically, the question focused upon the design of the fire station, not its location in the geography of the airport environment. It was also clear that some candidates did not have sufficient knowledge of the subject to be able to discuss the answer in detail.

Question 7.4: *Discuss the evacuation actions which should be undertaken by rescue and fire fighting personnel (RFF) in relation to rescues from aircraft.*

Many candidates answered this question very well, but a considerable number failed to mention important aspects such as: the passage of information between air crew and RFF personnel where possible, and the dangers of opening emergency exits and doors which may then give passage to smoke and flames within the fuselage. Extra marks were awarded for mention of the benefits of PPV usage to assist evacuation.

Question 7.5: *For each category of airport, there is a requirement to provide sufficient quantities of both principal and complementary extinguishing media. Discuss.*

The question prompted the candidate to discuss the purpose, properties, and use of each type of extinguishing media. Marks were gained where an explanation of each agent was given, and as to how quantities were determined. Candidates who included the modifications allowing for the substitution of principal agents with complementary agents in extremes of climate also gained good marks. The examiners also rewarded those who referred to the relationship between the amounts of extinguishing media required and the effective control time within the critical fire area.

Question 7.6: *Describe the concept of Zone Control when dealing with an incident involving civil aircraft.*

This was a popular question attempted by the majority of candidates. The concept of designating specific areas of operations and control at incidents appears to be generally well understood, judging by the standard of answers this year. Those who clearly identified the respective roles of each of the emergency and support services gained marks. Candidates who used a simple sketch, comprising an aircraft outline within three concentric circles, without an explanation, failed to attract marks. If using sketches to illustrate a point, sufficient detail should be shown to convince the examiner of the candidate's understanding of the zone concept.

Question 7.7: *Describe in detail:- (i) The types and characteristics of aviation fuel used by modern aircraft. (ii) The types of fuel tanks to be found on commercial and military aircraft.*

This two-part question gave the candidates the opportunity to demonstrate their knowledge of: (i) probably the most hazardous product associated with aircraft; it's fuel; and (ii) an aspect of aircraft construction. The majority who attempted the question had a good understanding of the uses to which the different types of fuel are put, and gave details of flashpoints, limits of flammability, and autoignition temperatures. The second part provided several comprehensive responses which detailed the tanks' construction, pressurisation and ventilation methods, location, and their vulnerability to damage. Candidates are reminded that when the question asks for a description in detail, a simple list of types is insufficient to attract a pass mark.

Question 7.8: *Discuss the factors to be considered when selecting and designing heliport sites onshore.*

A wide range of answers were submitted to this question, with only around half of the candidates gaining a pass mark. Some of the considerations frequently omitted were: noise nuisance, turbulence, tests, dual approaches 180° apart, dimensions of the heliport and a detailed knowledge of 'obstacle limitation surfaces and transitional surfaces'.

Paper 8 – Fire Investigation

Question 8.1: *a) Define the term 'fire load density'; and b) Describe in detail how it is influenced by the fire loading and ventilation available.*

A popular question leading to good marks for those candidates who showed an understanding of how calculations from fire tests are used to predict fire loadings and how fire resistance will be affected. Candidates who laboured over descriptions of the causes of fire and detailed accounts of how fire spreads did not fare well.

Question 8.2: *Spontaneous fires require very special conditions for their development. Discuss.*

It was apparent from the answers which candidates had a knowledge of the bibliography. Unfortunately, the majority of candidates tended to generalise and were not able to focus on the requirements of the question. Most were able to give an example of a smouldering fire, but very few discussed the role of heat transfer or localised destruction.

Question 8.3: *Discuss in detail the contribution of carpets and floor coverings to the development of fire.*

Whilst most attempts displayed an understanding of how floor coverings can contribute to fire development, few elaborated with the sufficient detail required to gain good marks. Many candidates concentrated solely on describing the various ways that different types of floor covering behave in fire but failed to explain how this information could aid or hinder fire investigation activities.

Question 8.4: *In relation to domestic wiring and switches, explain the post-fire indicators which will assist in the fire investigation and detail the hazards associated with each case.*

A popular question, unfortunately many candidates failed to gain a pass mark due to their failure to list the relevant hazards that the question asked for. Many gave the hazards relating to the safety of the investigator when carrying out the investigation.

Question 8.5: *With the aid of a diagram, describe the technique of gas chromatography.*

A complex question that proved to be the least popular on the paper. Of those who did attempt the question, however, over 50 percent gained a pass mark, with a number scoring highly. The highest marks were awarded to those who framed their answer in a methodical and simplistic form supported by a clear diagram.

Question 8.6: *Discuss in detail the interpretation of 'Char Depth' in timber as an indicator of the behaviour of fire.*

The majority of candidates displayed an understanding of the different charring patterns for slow and rapid developing fires, and the usefulness of charring in determining the direction of fire spread and point of origin. However, many failed to substantiate their answers with the potential for misleading evidence due to variable factors such as: ventilation; the effects of firefighting; type of timber; surface coatings; etc. The question lent itself to the use of explanatory diagrams and additional marks were awarded where these were used. A number of candidates described the signs and symptoms of collapse, or the chemistry of combustion, thereby missing the central point of the question.

Question 8.7: *Discuss in detail the problems that must be considered whenever human, or suspected human remains, are discovered at a fire scene.*

Despite this being an extremely popular question, only a small number of candidates achieved good marks. Those that did covered the essential problems from a fire investigation perspective, i.e. identification of the victim, cause and manner of death, circumstances at the time of fire, etc. Unfortunately, many candidates appeared to lose sight of the fact that they were sitting a fire investigation paper, and concentrated their answers on the firefighting and health and safety aspects of dealing with fatalities.

Question 8.8: *People who deliberately set fires usually use flammable liquid accelerants. Discuss the effects on the fire scene of these accelerants.*

The question gave the opportunity for candidates to discuss the topic and demonstrate their knowledge. There were some very good and informed answers. The majority, however, lost marks due to failing to cover the subject area in full.

Paper 9 – Marine Fire Studies

Question 9.1: *Describe in detail the information which the fire control plan of a passenger or cargo ship should contain.*

This was a popular question with several good scripts submitted. However, once again, a common error was not to read key words in the question. 'Describe in detail' does not mean 'list', and candidates who expanded from a series of broad headings gained the better marks. Whilst clear distinction between the types of bulkheads was necessary, precise detail as to the class A, B, C, or F was not necessary. Overall, the results were disappointing with less than half of those attempting the question gaining satisfactory marks.

Question 9.2: *a) Describe in detail the terms "centre of gravity" and "centre of buoyancy"; and b) i. Explain the effect that moving weight has on the centre of gravity; ii. Explain the effects of "heel" or "list" on the centre of buoyancy; iii. Explain the term "free surface effect".*

This was a popular question with nearly all candidates providing evidence of a good understanding of the subject matter, and only 10 percent failing to reach a satisfactory standard. Some candidates did not see the value of the simplest of diagrams to clarify points and similarly time was wasted in b(ii) where the question asked for an explanation of 'heel' or 'list' on the centre of buoyancy; several candidates explained both. Overall, a well answered question with several excellent scripts.

Question 9.3: *Discuss in detail the need for contingency plans for dealing with fighting fires on ships at sea.*

This was a straightforward question requiring a logical approach to the answer. Candidates who categorised their response into key areas, namely: notification of incidents, coastguard organisation, sea transport, air transport, communications, safety and training, tended to gain the better marks. However, the number obtaining satisfactory marks were very few. The use of phrases such as 'plans should be as comprehensive as possible' and 'many agencies should be involved' without further explanation gained no marks. Equally, the quoting of specific legislation needs to be correct.

Question 9.4: *Describe the five "elements of construction" used in ship design.*

Although a fairly straightforward question, it was not popular among candidates; and of those answering, only 50 percent achieved a satisfactory mark. The question focused on the five elements as described in the IFE Marine Studies book, page 91-95. Those presenting an answer in a logical flow seemed to gain better marks. The question did not focus on the fire-resisting requirements of bulkheads and decks, and a number of candidates wasted time writing irrelevant scripts.

Question 9.5: *Explain the procedures that Naval ship's personnel should adopt to assist a local authority (civilian) fire brigade in firefighting and control of an incident on board a vessel.*

The question was generally well answered by the majority of candidates. Those who did not attract high marks had not read the question properly. The question was not about naval firefighting procedures but about the **liaison** with local authority or civilian fire brigades.

Question 9.6: *Discuss the requirements for sprinkler systems in passenger vessels.*

Many candidates who answered this question understood the principles of low pressure sprinkler systems on passenger vessels. However, more marks were available to those who developed the discussion to include high pressure systems. This question required the candidate to provide specific facts and quote relevant standards, so those who resorted to bland, vague statements attracted few marks.

Question 9.7: *a) Define the term "SWATH" ships; and b) Describe in detail their construction.*

Most candidates were able to provide the required definition. The second part of the question was descriptive. Those candidates who used diagrams to assist in their descriptions gained good marks. Some diagrams, however, were line drawings only with no labels, which were virtually meaningless. Very few candidates included a description of the composite construction that permits the vessel to withstand forces generated in use.

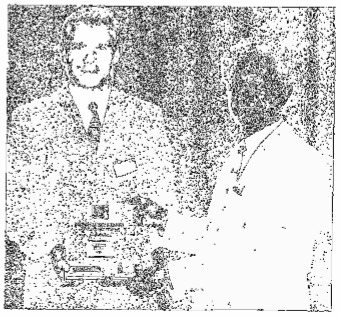
Question 9.8: *Discuss in detail the advantages of using onboard systems to contain fires on ships.*

As a general comment, candidates should not waste time by re-writing the question on the answer paper, the number is sufficient. This question was not answered particularly well. Most candidates identified the time it takes to assemble alternative equipment. The best answers considered each of the available onboard systems in turn, and considered the advantages of each. Answers should have made reference to CO_2, steam, foam and halon systems, and included fixed systems for the protection of exposed risks on decks. Additional marks were available for identifying special equipment provisions for applying water and other extinguishing agents.

GODIVA BEST OVERALL AWARDS — MEMBERSHIP EXAMS

Left, International President Dr R. W. Docherty congratulates Sandeep Dugga1 on winning the Godiva Best Overall Candidate (non-UK) Award.

Pictured right, Mr Mark Andrew Charles Rayner receives his Best Overall Candidate Award (UK) Godiva Award from Mr D. Ross of Godiva.



Graduateship Examination

Paper 1 – Fire Safety

Question 1.1: *Describe the fire hazards in an automated high bay warehouse and discuss what type of sprinkler and automatic fire detection systems you would recommend.*

This question reflects modern ideas of storage buildings up to 45 metres in height with computer controlled mechanical handling equipment. The fire safety provisions must therefore take account of this high risk, high tech procedure. Fast response sprinklers, between rack protection, high standards of automatic fire detection were some of the answers required.

Question 1.2: *a) How does an ionisation smoke detector detect a fire; and b) What are the disadvantages of this type of detector*

Overall, the responses were good, but extra marks could have been gained by explaining the theory side of ionisation, in how an atom is made up.

Question 1.3: *Define the following terms:- a) 'Dead load'; b) 'Imposed load'; c) 'Wind load'*

A very popular question, which was quite elementary in format. Most candidates obtained at least a pass mark, with many candidates obtaining very good marks.

Question 1.4: *Describe the physical differences that are apparent in slow and fast developing fires.*

Most candidates responded to the simple physical characteristics such as light and noise, instead of considering them together with fire characteristics such as heat release, pyrolysis products on colder surfaces, or high energy output. Therefore, although marks were awarded, many candidates failed to achieve an acceptable pass mark. Those candidates that applied their practical knowledge of fire in a scientific way scored better marks.

Question 1.5: *Fire safety within residential premises is dependent upon good housekeeping. a) Define the term 'good housekeeping' in this context.; b) Identify who is responsible for maintaining housekeeping standards.; c) List potential hazard areas.*

It was apparent that the term "Residential Premises" within the question was open to different interpretations, e.g. hotel, old persons home, dwelling, flats, etc. Marks were awarded according to the candidate's interpretation, a) Define – Too many candidates failed to give a concise, short statement of the term "good housekeeping", i.e. good management system with physical checks of determined risks and risk areas. b) Identify – well answered, but too many provided responsibilities not asked for. c) List – only headings required: potential hazards are: electrical faults and equipment failure; smoking materials; accumulation of rubbish; cooking activities, etc.

Question 1.6: *Mechanically operated ductwork systems can spread smoke and fire throughout a building. Outline the measures you would recommend to prevent this happening.*

Overall, this question was answered reasonably well. However, candidates usually answered the question either on the compartment, uses, design, and maintenance of ducts, or concentrated on the automatic fire detection and the dampers. Those candidates who covered the areas received good marks, especially when supported by a well labelled sketch.

Question 1.7: *When considering the behaviour of brick or stone load-bearing walls in fire, a) Identify the factors on which the stability of the wall depends; and b) List the general causes of collapse of walls when involved in fire.*

A question that has appeared in various forms over many years. The first part of the question dealing with the stability of brick walls was poorly answered with very few candidates mentioning the middle third or sketching it, the proportion of small stones in a stone wall, skill of the builder or the number and thickness of joints. The second part of the question was reasonably well answered, and high marks were scored.

Question 1.8: *Write a short article (approx 350 words) for a local newspaper to attract the attention of factory owners/managers giving guidance on fire safety in their type of premises.*

A very well answered question; most who answered it gained a pass.

Question 1.9: *Outline the main differences that would apply in relation to the fire precautions and its management in buildings of similar design, construction and dimensions where the occupancies are:- a) offices; b) hotel; c) residential home for the elderly.*

Not a popular question, attracting a disappointing number of passes. To address this question, candidates needed to identify the problems presented by the different occupancies, and effects this would have on the levels of: means of escape (travel distances, compartmentation, exit widths, protection); fire warning system (manual fire alarm, auto fire alarm, two-stage alarm, rapid response sprinklers); secondary lighting systems; fire routines management (notices, horizontal evacuation procedures, disabled persons, staff training).

Question 1.10: *Discuss the ways in which individual companies and organisations can manage arson prevention.*

A question drawn from a recent IFE Journal article entitled "Arson, the Problem that Won't Go Away" (*Fire Engineers Journal, Vol 58, No. 193, March 1998).* Too many candidates concentrated on the types of arsonist and socio-economic reasons for arson in society which, although important, did not answer the question. Very few candidates mentioned carrying out a proper risk assessment, the investigation of all fires and the physical design of buildings to help minimise the risk and impact of arson. The general level of scripts was disappointing, with few attaining above-half marks.

Paper 2– Operations

Question 2.1: *Outline the specification for: a) a bulk water carrier; and b) List the advantages of using this vehicle over conventional methods of relaying water.*

Most candidates gained valuable marks with part b); however, candidates struggled with part a) of the question. The following would have gained marks: 1. Large water capacity - 9,000 litres or over; 2. Ability to carry equipment - i.e. LPPs/dams; 3. Process of delivering water is continuous; and 4. Large volumes of water compensate for longer transit times.

Question 2.2: *Describe in detail the construction and operating principles of thermal cutting equipment which may be used for heavy duty cutting during fire brigade operations.*

Not a popular question, with many candidates not answering the question. Answers showed a scant knowledge of the subject matter. Many candidates, it seems, could not differentiate between thermal cutting equipment and oxy-acetylene equipment. Most candidates relied on the equipment found in their brigades, rather than reading the bibliography.

Question 2.3: *Describe the particular characteristics and hazards of burning rubber and discuss how they affect fire-fighting operations.*

A popular question and relatively straightforward; however, candidates invented statements like "Inform the met office", "Use of guide lines to get to the seat of the fire in the open". The question lends itself to a huge rubber fire in the open. Valuable marks were lost going into too much detail over smoke. Good marks would have included the following:

1. Large amounts of toxic smoke given off;
2. Rubber will flow at 400°F, with related problems;
3. Copious amounts of water to extinguish;
4. B.A. for all crew; and
5. Rubber to be split/pulled apart, and close firefighting using hard hitting jets would be the most effective way of putting out the fire.

Question 2.4: *Describe the actions which should be included in control room procedures for dealing with emergency calls.*

This question should have attracted high marks had it been answered in a logical way, following the basic actions from the time any emergency call is first received. Several candidates had clearly understood the question and studied the subject, and consequently gained good marks. On the other hand, the majority of candidates relied on their practical knowledge of the procedures in a control room; this, however, was not enough and there were clearly gaps in their knowledge and were therefore marked accordingly. The syllabus must be studied to pass this exam; relying on factual knowledge or experience is not enough.

Question 2.5: *a) Outline the skills required for a specialist chemical decontamination team; and b) Describe the equipment which you would expect this team to have available.*

This question proved popular, and, pleasingly this was reflected in the number of good scripts submitted that gained good marks. On the down side, a number of candidates gave brief answers and therefore failed to gain reasonable marks through not covering the subject adequately. Reference to 'decontamination kit' was not sufficient, and candidates need to take more care in assessing what the question requires. This also applied to those candidates who gave detailed descriptions of the decontamination procedures. The question did **not** require this, and therefore valuable time was wasted for **NO** marks.

Question 2.6: *Describe, with the aid of a sketch, a) a priming system which uses the exhaust gases from the engine; and b) explain the principles of operation of one other priming device suitable for use with centrifugal pumps.*

Not a particularly well answered question. Although many candidates knew the principles of exhaust gas ejectors, and the Venturi principle, it was not often explained **how** they worked. This was apparent by the number of diagrams or scripts that put values in the wrong place. With regard to reciprocating primers, few candidates made reference to the main pump drive by means of either a friction clutch or a wheel-type friction drive. The recommended engine speeds in r.p.m. was rarely mentioned. There generally was a poor understanding of some of the basic concepts in the different types of primers. Overall, it was very apparent which candidates were answering questions from practical knowledge and experience, and those that had clearly studied and understood the subject. The candidates that had studied gained the higher marks.

Question 2.7: *Discuss the problems associated with fire-fighting on board a 'container' ship.*

Candidates should read the question. Many good scripts were submitted dealing with general ship firefighting to which minimal marks were awarded. Those who concentrated on particular problems associated with container ships scored well.

Question 2.8: *List the points which need to be considered by an incident commander when taking charge of a large fire.*

A very popular question with a disappointing set of answers. Too many candidates relied on their personal knowledge, rather than reading the bibliography. It was a bread and butter question badly answered. This question was an opportunity lost by many candidates, although 30 percent did gain a pass. The question called for a list, and those candidates producing a list generally obtained a pass mark. Too many candidates went outside of the question's parameters, so wasting precious time. Candidates must take a few minutes to read the question and understand what information is being asked for.

Question 2.9: *Briefly describe the component parts of a self contained compressed air breathing apparatus (CABA) and explain the passage of air from the cylinder(s) to the wearer at the face mask.*

Many candidates listed component parts instead of describing the parts. In the majority of scripts, the description of the parts and passage of air was far too brief to gain good marks. Many candidates omitted vital components altogether, e.g. positive pressure valves, warning whistle units, contents gauges and the provision of ancillary equipment. Some candidates described operational wearer procedures, working durations for CABA and even described after use servicing of the sets. In some cases, candidates only completed the first part of the question. In summary, I feel that the candidates did not fully read and understand what the question asked for.

Question 2.10: *Describe what is meant by 'pressurised foam concentrate supply'*

Most candidates did not answer the question. Answers relating to specific fixed installations attracted few marks. Those that addressed pumped foam supplies, metering devices, and distribution manifolds fared better.

Paper 3 – Fire Engineering Science

Question 3.1: *As the temperature rises, the pressure inside a cylinder increases according to the general Gas Law equation*

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

where P = pressure, V volume, and T the temperature.

The strength of the cylinder decreases at a rate defined by the equation

$$S = 500 - kT^2$$

where S is the strength, k a constant (3 x 10^{-5}) and T the temperature.

If the original pressure in the cylinder is 28 bar (at 0°C), and assuming any increase in the volume of the cylinder is negligible, use a suitable graphical method to find the temperature and pressure at which the cylinder will burst.

A disappointing set of answers with very few students gaining good marks. Students generally either misunderstood the question, miscalculated or produced poor graphs. It was essential the provided graph paper was used. To gain high marks, all that was needed was to calculate the relevant pressures and values for the strength of the cylinder over a range of temperatures. These results should then have been plotted onto graph paper, and the temperature and pressure at which the cylinder would burst could then have been determined from the graphs.

Question 3.2: *A simple lighting circuit contains a light bulb in series with a voltage supply. If the mass of the 95 ohm resistor is 1 gram, its specific heat capacity is 400 J/Kg°C and it is required to reach an operating temperature of 1250°C in 0.8 sec, what voltage will be required in the circuit ?*

As with so many questions involving electricity, the model answer would be expected to contain both references to electrical laws and calculations. All of the components were contained within the question, yet some were missed. The responses were classed into groups – those who knew and those who didn't. Some lost marks due to using incorrect units; others would have gained marks if the workings were shown in detail. This would have helped the examiner to identify at what point in the calculation it went astray.

Question 3.3: *Calculate the minimum size of the expansion gap required between a beam and a wall if the temperature difference is from –20°C to 90°C, the beam which is 10 metre long is fixed at the opposite end, and the wall is 500 millimetre thick and expands equally in both directions.*

Coefficient of Linear Expansion of Steel = 0.000012 / °C
Coefficient of Linear Expansion of wall = 0.000011 / °C

This question required candidates to calculate expansion in one direction of a steel beam, and expansion in two directions for a wall. The wall will only extend towards the beam in one way (the expansion the other way will travel away from the beam); therefore, once the expansion has been calculated, it needs to be halved. Some candidates doubled the total wall expansion, and some halved the steel beam – both of these approaches are incorrect. The temperature range given was –20°C to 90°C, and the question required candidates to find the overall temperature change; 70 was a popular figure, but unfortunately was incorrect. Mistakes were also made by combining the use of millimetres and metres, rather than converting all measurements to one denomination. The final part to the question required a straight forward addition of the two expansions: some candidates used subtraction for this calculation, which would have the effect of reducing the required gap, rather than extending it.

Question 3.4: *Explain in detail why plastics are a special hazard in a fire. Use suitable examples and reference to their chemical composition in your answer.*

It is worth pointing out to candidates that this paper was intended as a science paper, rather than operations paper. Answers, therefore, that concentrated on firefighting tactics (including BA procedures) and extinguishing media were not awarded marks. Whilst many candidates gave some detail on the products of a fire involving plastics, e.g. heat, smoke and toxic products, few explained why.

Question 3.5: *a) If 2.5 cubic metres of propane, contained in a cylinder at a pressure of 7 bar, is burnt in a controlled manner in the atmosphere, what volume of carbon dioxide would be produced under stoichiometric conditions?*

b) If this were released into a room measuring 5 x 4 x 2.5 metre what would be the resulting percentage concentration of CO_2?

As with all equation questions, there are easy marks to be gained if candidates: a) know the correct formulae to use, and b) are accurate in their working out. Disappointingly, very few candidates attempted this two-part question, and even fewer managed to score well on both parts.

Question 3.6: *On arrival at an incident you are told that a radioactive source is involved and that it is a beta emitter. Upon investigation you subsequently discover it to be an alpha emitter. Explain what you understand these terms to mean and outline the dangers to your crew.*

This question was set to explore the candidate's knowledge of basic radioactivity, in particular the characteristics of alpha and beta particles. By implication, the question required an assessment of the risks

associated with each type of emitter, and whether or not additional risks would be encountered when the source was subsequently discovered to be an alpha emitter.

Question 3.7: *If a pump outlet pressure is 7 bar and produces a velocity of 6 metres per second in 125 metres of 70 mm hose what will be the outlet pressure at the 25 mm branch and calculate the discharge?*

Assume f = 0.003

This question was in two parts; it required the candidate to work out the pressure at the branch, and then obtain the discharge. Most candidates followed a logical course, and gained marks for their effort. Some candidates, however, attempted to complete part two before they had obtained the correct values from the first part of the question. This resulted in a loss of marks. When answering mathematical problems, candidates are advised to apply a logical method of solving the problem using the information supplied in the question.

Question 3.8: *a) What is the braking force required to stop a fire tender with a mass of 12 tonne, travelling at a speed of 64 km/hr within a distance of 100 metre? b) How long will it take the tender to come to rest?*

The answer to this question required a knowledge of the basic laws and equations of motion, together with their practical application. The majority of those attempting this question were either unsure of the processes involved to reach the solution, or failed to apply the correct units into the equations.

Question 3.9: *a) Define the term combustion; and b) Explain the principles involved in the extinction of fire referring to the chemical reactions which occur.*

If ever there was an 'old chestnut', this had to be it. Consequently, it was a popular question. Any candidate who could get down the standard definition, followed by a reference to the triangle of combustion and an explanation of cooling, smothering and removal, was guaranteed a reasonable mark. As ever, those depressingly few candidates who bothered to read the whole question were able to pick up a few extra valuable marks by making references to the chemical reactions that occur.

Question 3.10: *a) If a 7 KW heating element at 240 volts is used to heat 15 litre of water at an initial temperature of 18°C what will be its temperature after 6 minutes ? b) If the same element were used at 110 volts, how long would it take for the same amount of water at the same initial temperature to reach the same final temperature.*

High marks were gained by many students who answered the question in a methodical manner, and clearly showed all calculations. However, several students did not understand the question and used incorrect formulae. To gain good marks, the heat produced should have been calculated. Then, using the formula heat taken in by water = mcθ, the temperature rise determined and subsequently the final temperature of the water calculated. The next step was to calculate the resistance of the element, the power dispelled at 110 volts, and finally time for same amount of water to reach the same temperature as previously.

Paper 4 – Management and Administration

Question 4.1: *Discuss the legal responsibilities and powers fire brigades possess to enable them to limit the damage caused whilst in attendance at a fire.*

This question was specifically looking at the legal responsibilities and powers of fire brigades whilst in attendance at fires. Long explanations of training, inspections and fire prevention advice were not required. Candidates should also realise that this was a management paper question, and firefighting techniques would not be appropriate on this paper. Most candidates were aware of the powers of entry, and where these are detailed in the relevant legislation, although stating this without further explanation that this only applies to fires, protection from fire, or for rescue did not attract full marks. Additionally, it was necessary to emphasise that the senior fire brigades officer present shall have sole charge and control at fires. Similarly, comments on his powers to restrict/increase water supplies and to control traffic in the absence of a police officer would have been beneficial. Other areas to consider could have included: spread of fire to other buildings, salvage operations, fire breaks, removal of building contents, etc.

Question 4.2: *(a) Explain what is meant by an organisational chart; and b) List their advantages and disadvantages.*

It was obvious from some scripts that the question had not been read properly, which lead to good scripts being produced, but for the wrong question. Candidates who had drawn simple organisational charts gained good marks for the illustration. Though there was a general understanding of the organisational chart, only a few candidates went on to explain its use. When asked to list advantages and disadvantages, it is not good enough to put down just one example of each and expect good marks!

Question 4.3: *Outline the criteria you would use to evaluate the performance of a lecturer/instructor giving a presentation to a group of students.*

This was a basic management question which offered the opportunity for candidates to gain very good marks. However, most only achieved a moderate level of marks. Marks were lost by candidates for: repeating the same points; concentrating on the assessment of the students when they should have been evaluating the instructor; and too many superficial matters, e.g. dress, appearance, hands in the pocket, etc. The examiner was looking for an outline of the subject, not a detailed analysis of the presentation. What follows is a general idea of what was required to achieve good marks:

Enthusiasm and interest in the subject being taught; ability to organise and deliver the subject content effectively and interestingly; ability to motivate, stimulate and maintain student interest and learning attitude; have good classroom management skills to efficiently 'run' the session(s); a honest, reliable and conscientious approach; absolute fairness when awarding marks and grades; resourcefulness and persistence; a good sense of humour; an equality of care for students of all ages, sexes and ability; and a rehearsed and well planned, effective, and credible style of delivery.

Question 4.4: *Briefly discuss the benefits and drawbacks of a computerised system of record keeping.*

Computers are here to stay, unless something unexpected occurs at the end of this year; and it was obvious in the way that this question was answered that candidates are becoming fully aware of their benefits and drawbacks. Those who did not achieve high marks omitted to mention such items as: use for analysis of trends and statistics; ability to link up with other systems and equipment; initial costs of hardware and software, along with costs of updating; and the requirement of staff training. One important aspect gained by the examiner from the answers received was that few, if any, candidates would return to manual record keeping having once used a computerised system.

Question 4.5: *To function under the law a fire authority needs to make provision for fire fighting purposes. Identify such provisions and briefly describe how they should be secured.*

Although generally well answered by home candidates, it was disappointing that those candidates overseas were less sure, in some cases, of the law relating to the provision for firefighting purposes within their particular area. A point to be noted well by the home candidates, which also applies to some overseas areas, is that the provision is specifically to meet all normal requirements. The implications of these important words are to be borne in mind. Candidates might also be more careful to differentiate between what a fire authority is required to do, and what powers it has, which it may or may not carry out. Legislation within the context of this paper (Management and Administration) should not fail to receive close study by candidates.

Question 4.6: *Total Quality Management (TQM) has been adopted by many organisations world-wide. The majority of organisations who have decided to build TQM into their operations have opted for more 'focused' techniques. Outline these techniques.*

Considering that TQM is a very topical subject, the standards of the few scripts attempted were abysmal in the extreme. Candidates should study Glenys Southworth's textbook on TQM, *An Introduction to Total Quality Management.*

Question 4.7: *What areas of individual need would you seek to satisfy in order that enhanced task means might be met?*

This question was only looking for areas of individual need. Candidates who tried to put down everything they could remember of Maslow, Herzberg, etc. in the hope that the examiner will pick out the relevant part will have been disappointed. Candidates who included such items as recognition, additional training, appreciation and status were on the right lines.

Question 4.8: *Prepare a report form and check list for a driver of a fire service heavy goods vehicle involved in a road traffic accident whilst responding to an emergency incident. (The checklist should record in order of importance the details to be obtained about the accident.)*

This was a popular question, which had the potential to attract good marks; however, if candidates duplicated what they have on the form onto a checklist, then marks were only awarded once. Very few candidates actually informed their control about the accident, which should have been the first task done. Some candidates confused the checklist with the vehicle maintenance checklist.

Question 4.9: *Objectives are widely used as the basis for the effective management of organisations. a) List the factors to be considered when preparing objectives; b) Describe the advantages of having objectives.*

With the wealth of information available on the subject, it was not surprising that the question was generally well answered by candidates. However, some candidates did not fully appreciate the advantages of having objectives.

Question 4.10: *An interviewer must be able to ask the right type of question in order to elicit the required answer. List the types of question that an interviewer may ask and give an example of each.*

The question required candidates to provide the types of question, such as: Open, Closed, Specific, Reflective, Leading and Hypothetical, and give an example of each type. Those candidates that chose to ignore this and instead provided a virtual dialogue of an imaginary interview with no reference to the above requirements attracted no marks.

THANK YOU

Sean Greene, IFE South West Branch member, is thanked for his assistance during the conference – and encouraged to study further!

GODIVA PRIZE AWARD WINNERS (GRADUATESHIP):

Left, Sally Angeline Tyrrell – Best Overall Candidate (UK) Godiva Award. Below, Gnanapragasam Aloysius Best Overall Candidate (non-UK) Godiva Award.

IFE West Midlands Group

Examination Study Course 1999-2000

Commences 4th October, 1999, 1900 hours

The course is open to all interested parties AND IS ENTIRELY FREE!!

The aim of the course is to provide advice, guidance and help to the students as they prepare for the IFE (Graduateship and Membership) and Station Officers examinations.

TUTORIALS: Expert tutors will assist those undertaking the exams. The syllabus for each paper will be carefully explained, and advice given on areas to concentrate upon, recommended reading and its availability detailed, any likely potential pitfalls indicated, and past examination papers studied in detail.

STUDY DAYS: Further lectures will be provided, including a "Science Day" to cover key areas of the syllabus, and a number of visits have been arranged so that the student can see the theory put to practice.

PRESENTATIONS: As with last year, a representative of the IFE Examination Board will discuss examination technique, and give the students a clearer idea of exactly what the Board is looking for.

PLENARY WEEKEND: The course will culminate with a 'Plenary Weekend School' (again free) during which students will have a chance of a final cramming session courtesy of our expert tutors and lecturers.

VENUE: Sessions will be held at the West Midlands Fire Services Training Centre, Dartmouth Road, Smethwick.

HOW TO ENROL

For full details contact Steve Sharpe, MIFireE on
Tel. (0121) 704 3755 (Solihull White Watch) or (01564) 826063 (home)

Examination Technique

A candidate's guide to studying for the IFE examinations

by John Cowie, FIFireE – Chairman, Education Committee

1. Introduction

Many candidates have failed an examination before they even enter the examination room, because of inadequate preparation. A casual reading of IFE publications or the Manuals of Firemanship will not ensure a pass. The information required by the questions is detailed and specific, and, even in papers concerned with fireground operations, it is not enough to assume that because you are on operational duties you automatically know enough to pass without further work.

2. Exam Preparation

Most candidates are insufficiently prepared for their examination. How, then, should one prepare? Learn to learn. If the material is descriptive then a casual reading will not be enough, so, try this method:

(a) Read the section you are studying quickly, to get an overall impression of it.

(b) Read it again, more slowly and carefully.

(c) Close the book and make notes on the section.

(d) Check your notes by reading the section again quickly. Notes mean notes, short notes on the essence of what you have read, not a lengthy paraphrase of the whole of the section.

(e) Search past examination papers for a question on the topic you are studying. Without reference to your notes or the book, draw up a skeleton answer then check the answer against your notes.

- Learn to calculate. Learn to use either a calculator or a set of log tables quickly and accurately or you will never complete the questions which involve calculation within the time allowed.
- Learn to handle formulae. Know the units to use; know how to transpose them.
- Learn the basic chemistry and physics involved in fire engineering.

As the examination gets close you should spend more time on working specimen examination questions. But always do these without help of notes and books; do them against the clock so that you are used to fitting your answers to the time available; and check your answers if possible by working with friends and checking each others' answers.

On the day before the examination, check over all the things you will be taking with you to the examination room and put them together so that nothing is forgotten. Go to bed early and on the following day get up in time to allow a leisurely journey to the examination centre. Do not try last-minute cramming. Relax!

At the examination:

First check that you are answering the right paper! It sounds silly, but every year someone attempts the wrong one.

Secondly, read right through the paper, decide which questions you can do best and which you know less about and will leave until last.

Thirdly, slowly read the first question you are going to attempt and make certain that you understand it.

3. Common faults

A few years ago, five years' of collected examination scripts were analysed to identify the most common faults. The list had 17 major faults:

1) Poor handwriting
2) Poor spelling
3) Inaccurate use of terminology
4) Poor expression
5) Poor punctuation
6) Poor sentence construction
7) Lack of logical presentation
8) Failure to make lists when required
9) Failure to make comparisons properly
10) Poor distribution of time between questions
11) Mistakenly thinking some questions are catch questions
12) Attempting the wrong number of questions
13) Copying questions out
14) Failure to answer questions set
15) Failure to follow instructions
16) Not enough use of, or poor standards of, illustration
17) Inclusion of irrelevant items

1 to 6 of these concern the use of English, and this is important for two reasons: **Firstly,** what you have written on the examination script is all that the examiner has available to judge your ability. If what you have written does not make sense you cannot be given credit for it.

Secondly, is the time factor. In my experience, the marker has only a week in which to mark about 900 examination scripts, so there is little time to try to puzzle-out what is meant by a candidate whose answer to the question consists of three pages of badly written, garbled, ungrammatical "English".

7. Most questions have a logical sequence to their answer, and if you follow this sequence you achieve two things: You demonstrate to the examiner your ability to think logically, and you help yourself because it is easier to spot if you have missed anything in your answer.

8 & 9. Failure to make lists when required and to make comparisons properly stem from the same cause, failure to read the question properly, which results in giving the wrong answer or the right answer in the wrong form.

Let us consider the different ways in which examiners can ask for information. The words you find in the questions are: LIST, EXPLAIN (or GIVE REASONS FOR), DEFINE, STATE, COMPARE, DRAW OR SKETCH, GIVE CHEMICAL EQUATION FOR, and CALCULATE. See the box on the next page for details of what is required when these terms are used.

10. Each question has 20 marks allocated and these 20 marks are for the answer which a good candidate who knows his subject can be expected to write down in the time available. If you spend twice as long, you will still only get 20 marks and zero for the question you did not have time to do.

11. Do not think that some questions are catch questions. Quite simply there are no catch questions. There are, however, questions in which candidates catch themselves out without any aid from the examiner!

12. Do not attempt the wrong number of questions. Sounds silly but it happens, don't let it happen to you.

13. Copying questions out is a silly waste of time – the examiner has a copy of it, he wrote it!

14. Failure to answer the question set is probably the most common cause of failure. There are probably two reasons:

- One is not reading the question properly
- the other is being "triggered" by some word or phrase in the question. When this triggering occurs the candidate writes down everything he knows about the trigger word whether it has anything to do with the question or not. For example, take the 1974 Graduate Examination Paper 1, which had a question about the spontaneous ignition temperature of a fuel. Many, many candidates read the words "spontaneous ignition" and gave me a long, and usually incomplete, description of how a haystack could catch fire if the hay was stacked when damp.
- I suppose that there is a third way in which a candidate can fail to answer the question set and this is by answering the question he hoped the examiner had set!

15. Failure to follow instructions is another common fault. Read the text at the beginning of the examination paper on the front cover of the question paper and answer book!

16. The standard of drawing and sketching displayed by candidates is very low. Art is not required, but clarity is. Clarity does not come without practice and you should practice sketching at any opportunity, not just when practising examination questions. A few basic rules might help:

(a) Hold your pencil lightly-keep your finger and wrist muscles relaxed.

(b) Have pencils of a decent length, properly sharpened and not too soft about a 2H and a good CLEAN eraser.

(c) Sketch in the whole of the outline very lightly before starting.

(d) if you are sketching a curve keep your wrist on the concave side of the curve.

(e) When drawing a cross section start at the middle and work outwards (otherwise you may come to the middle and have insufficient room).

(f) Use colour where it will help;

(g) MAKE IT BIG!

17. The inclusion of irrelevant items is bad from two points of view. It wastes your time, and it wastes the examiner s time. The second is serious from my point of view. I try to keep an attitude of Christian charity towards the candidate, but when you have to dig out three lines of fact from two pages of waffle, it is very difficult!

4. What does the examiner want?

- Facts
- Relevant facts
- Relevant facts-logically expressed
- Relevant facts-logically expressed-concisely put
- Relevant facts-logically expressed-concisely put-clearly illustrated
- Relevant facts-logically expressed-concisely put-clearly illustrated -correctly calculated

5. Summary

As candidates prepare for the forthcoming IFE exams in 2000, I feel that the best advice to give is to do just that, be ***PREPARED****. The worst thing that can happen to you is that something comes as a surprise when you are at your most vulnerable and the adrenaline and 'big match nerves' are all working overtime during the exam sessions.*

In taking over the role of Education Committee Chairman from Bob Docherty in July last year, and having served on the Committee now for 16 years, it never fails to surprise me that the same mistakes can be made consistently year after year.

On behalf of all question setters, markers and invigilators I commend the contents of this article as sound advice and a recipe for examination success.

LIST means list, not write an essay. List one item per line, generally one or two words or a short phrase. Number or letter each item of the list. List in the order required by the question unless it is clear that a random order is sufficient. These words have definite meanings and the candidate must give the examiner the information in the form asked for. The common sequences for listing are in order of: Size or magnitude of some physical property; Date or time; Step by step to describe a procedure; Rank; Class (sets of similar things).

EXPLAIN (or Give Reasons for) is not "State". Explain implies that you are required to give either:

(a) The reasons why a situation exists;

(b) The reasons why a situation is satisfactory (or not);

(c) The actual results of a situation,

(d) The possible results of a situation.

DEFINE means to restate the word being defined in other words of similar meaning generally adding a short description, e.g. "Define Spontaneous Ignition Temperature" (Grad 1975). The Temperature at which a substance will ignite without an outside source of ignition.

STATE Generally this is in the form

(i) "State Ohms Law" or (ii) "State the chemical formula for methane". This leads to the simplest form of answer:

(i) Voltage drop = Current x Resistance

(ii) CH4

Write down what you have been asked to state. THEN STOP!

COMPARE Comparison questions often give more problems to candidates than almost any other. Often this is because their answers stray outside the framework of the question because all comparisons are made from a specific point of view which will be indicated in the question, and candidates often introduce irrelevant comparisons in their answers. Candidates also make their work more difficult by failing to use tables to lay out the comparisons wherever possible. Comparison questions may involve comparing objects or procedures and for each there will be a number of factors relevant in any particular comparison. The tabular layout should be your guide in planning your answer even if the answer is going to be given in the form of an essay.

DRAW OR SKETCH Here the advice is very simple:

- MAKE IT BIG
- MAKE IT CLEAR
- USE COLOUR + HATCHING WHERE REQUIRED.

"Make it big" is the first rule you paid for the paper with your examination entry fee-half a page or a whole page is about right. LABEL IT CLEARLY.

GIVE CHEMICAL EQUATION FOR Use the right symbols. Make the equation balance. Give any other information required (heat absorbed or given off, catalysts, etc.).

CALCULATE Get the units right and show what those units are. Show each step of your calculation and do any rough work alongside your answer so that if the answer is wrong the examiner has some clues as to where you went wrong and can give you credit. A formula written down with the wrong answer beneath it cannot be given marks. Show the working and credit can be given.

Preliminary Examination
Sample Questions

There are 120 multiple choice questions on the examination paper, all of which should be attempted within the time allowed of three hours. Questions are based on the current syllabus and the Preliminary Certificate Studybook. They cover the following subjects.*

Part 1 – Fire Engineering Science

Basic Units
Fluids
Pumps and Water Supply
Heat
Chemistry and Combustion
Electricity

A quadrilateral with only one pair of sides parallel is a: -
a) parallelogram
b) rectangle
c) rhombus
d) trapezium

What is the flow from a 25mm nozzle at a branch pressure of 4 bar, given the formula $^1/_2\ d^2\ \sqrt{P}$ where the symbols have their usual meaning?
a) 833 litres/min
b) 843 litres/min
c) 862 litres/min
d) 1666 litres/min

Which of the following is lighter than air?
a) Carbon Dioxide
b) Sulphur Dioxide
c) Ammonia
d) Chlorine

The Celsius temperature scale is:-
a) 0-80°
b) 0 - 100°
c) 32 - 212°
d) 0 - 273°

The flow of electric current is measured in:-
a) Volts
b) Watts
c) Ohms
d) Amperes

Part 2 – Fire Service Operations

Practical Firemanship
Appliances and Equipment

On arrival at a fire, what is the first responsibility of the Officer-in-Charge of the first appliance to arrive?
a) Locate a hydrant
b) Carry out any necessary rescues
c) Extinguish the fire
d) Assess the need for further assistance

* Copies of the Rules, Regulations and Syllabuses for the Institution's Examinations are supplied with new member welcome packs; the document is also available for download from the IFE website at www.ife.org.uk

Who decides whether breathing apparatus is to be worn at a fire?
a) The wearers
b) The Officer-in-Charge
c) The BA Entry Control Officer
d) The BA Main Control Officer

When should a sprinkler system operated as a result of a fire, be shut down?
a) Only on the order of the Officer-in-Charge
b) Only when absolutely necessary
c) As soon as possible
d) On locating the main stop valve

Which one of the following is classed as an inert gas?
a) Carbon Monoxide
b) Methane
c) Hydrogen
d) Nitrogen

Part 3 – Fire Safety

Building Construction

Character and Use of Building Materials
Elements of Structure
Other Elements of Structure

Fixed Installations

Automatic Sprinklers
Drenchers
Water Spray Projection System
Rising Mains
Fire Alarm Systems

The expansion rate of Aluminium is:-
a) one-third that of steel
b) two-thirds that of steel
c) three-quarters that of steel
d) twice that of steel

Reinforced concrete is:-
a) strong in compression and weak in tension
b) weak in compression and strong in tension
c) strong in compression and tension
d) weak in compression and tension

The prime function of a fire detector is to:-
a) sound the alarm in the affected area
b) sound the alarm throughout the entire premises
c) detect one or more changes in the protected environment indicative of the development of a fire condition
d) activate fixed firefighting installations and automatically close doors, windows and vents in the affected area

The main advantage of a closed circuit fire detection system is:-
a) the alarm is raised at Fire Service Control immediately
b) it is very cheap to install and operate
c) there are very few moving parts
d) it is self-motivating

Fire Investigation – Membership Exam

by John Williamson, DipFM, FIFireE*

Paper 8 - Fire Investigation, has been available as an optional paper for some years now; and as the person currently responsible for setting the examination, I would like to make future candidates aware of a few general points.

Fire Investigation is a fascinating subject which has developed rapidly in recent years, and I am sure you would agree that I should incorporate the latest thoughts and topical issues into our "Member" examination.

I do not wish this brief article to sound like another version of the examiners report; but candidates should remember that this is the Membership examination, the flagship of the Institution's examinations. Candidates can not expect to present a few thoughts based perhaps on experience and stand any chance of coming close to passing this paper. It must be said, however, that they still attempt to do this, year after year!

There was a time when the general perception was that to be successful, one only needed to check out the syllabus and then scan through good old Cooke and Ide's "Principles of Fire Investigation" and you were there! I must make it perfectly clear that I do not wish to criticise this old faithful, it is still a superb book and I have used it and referred to it so often. I did mention earlier that fire investigation has moved on rapidly, and candidates need to read as widely as they possibly can. Cooke and Ide was published by the Institution as long ago as 1985, when I was only a young thing (I wish!). Views on some of the topics and subject areas have changed over the years, and some small points are indeed, not acceptable in 1999. We do, of course, know so much more about fire investigation even compared with ten years ago.

In 1993 my good friend and mentor Douglas Leitch MBE, one of the most experienced and accomplished operational fire officers that I have ever met, authored the book *"A Guide to Fatal Fire Investigations"* published by the IFE. This book should be on every candidates reading list, and is an excellent source of information for those who have little experience in this very specialised field. This applies not just to those studying for the fire investigation examination paper, but to those actually doing the job!

In 1969 (I had only been in the job for 2 years then, I told you I was young!) Paul Leland Kirk had his book "Kirk's Fire Investigation" published in the USA. This work soon became one of the most widely read textbooks in fire investigation, but sadly not long after his book was published, Paul Kirk died at the age of 68.

Some years later, along came a young American scientist and criminalist called John DeHaan (A very young chap, same age as me in fact!); John brought Kirk's book up to date, correcting a few errors and discussing areas of disagreement. John DeHaan completed the latest edition a couple of years ago; and this fourth edition was published by Brady Prentice Hall in 1997. This book is, for me, the definitive work in the field of fire investigation; and anyone with a serious interest in the subject should have this book on their bookshelf - not gathering dust! I use mine regularly for reference. Even John DeHaan himself was once asked in court to recite a piece of the book's technical data from memory. When criticised by counsel for not doing so, John replied to the court that "the book is there for reference and that is why I wrote it!". Nice one John.

The National Fire Protection Association (NFPA) in the USA have produced some excellent work in our field and they continue to do so. Their "Journal" is always of very high quality and provides some of the best reading in fire related areas.

NFPA 921 Guide for Fire and Explosion Investigations 1998 Edition, contains some first class material and I will use their own explanation of the scope of their document:

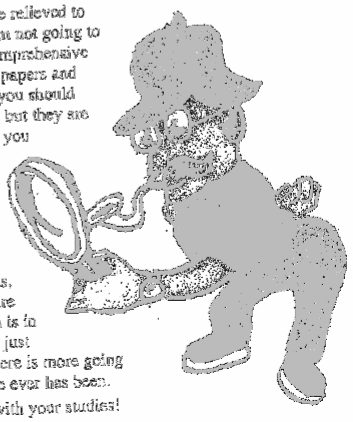
"This document is designed to assist individuals who are charged with the responsibility of investigating and analysing fire and explosion incidents and rendering opinions as to the origin, cause, responsibility, or prevention of such incidents". *NFPA 921 Page 5.

It is always interesting to compare and contrast different works and I think that this document tackles likely problems in a most refreshing way. One has to remember that legal reflections pertain to the USA; however the principles are very similar, and for me, any help in this area is well received. It is not often that we get experience in court regarding fire investigation matters and it seems foolhardy to hone one's forensic skills in the actual court arena!

FM Global (They used to be known as Factory Mutual) have produced "A Pocket Guide to Fire and Arson Investigation" which is a most useful tool. I'm sure that you will have seen their little booklet over the years, but it has just been completely rewritten and updated by Mick Gardiner, and he has done a great job. John DeHaan did some work on it and I even contributed myself!

In the UK the Home Office scoping study, Safer Communities: Towards Effective Arson Control, was published in May 1999 and is definitely worth getting yourself a copy. The Chief and Assistant Chief Fire Officers Association (CACFOA) published their views on fire and arson investigation in January 1999.

The Arson Prevention Bureau have also been high profile and their regular newsletters are always worth a read and I'm not just saying that because I have contributed now and then! They have run conferences and seminars from time to time and you might be lucky enough to be able to get to one of them. Every bit helps!



You will be relieved to know that I am not going to rattle off a comprehensive list of books, papers and journals that you should have to hand, but they are out there and you will find great rewards if you go and have a look. Shape your thoughts, the area of fire investigation is in the spotlight just know and there is more going on than there ever has been.

Good luck with your studies!

* John Williamson is an Assistant Chief Fire Officer in Lancashire Fire & Rescue Service and has served in Lancashire, Grampian and Strathclyde. He has for some years, set "Member" papers for Aero Fire Studies and Fire Service Operations

The Booklist

STATIONERY OFFICE MANUALS OF FIREMANSHIP

			Qty	Amount
Book 2	Fire Brigade Equipment	£10.25	___	£___
Book 4	Incidents involving Aircraft, Shipping and Railways	£14.25	___	£___
Book 5	Ladders and Appliances	£9.85	___	£___
Book 6	Breathing Apparatus and Rescuscitation	£9.00	___	£___
Book 7	Hydraulics, Pumps and Pump Operation	£10.55	___	£___
Book 8	Building Construction and Structural FP	£10.80	___	£___
Book 9	Fire Protection of Buildings	£8.20	___	£___
Book 11	Practical Firemanship I	£9.95	___	£___
Book 12	Practical Firemanship II	£11.50	___	£___
Part 6b	Practical Firemanship II	£13.45	___	£___
Part 6c	Practical Firemanship III	£14.95	___	£___
Fire Service Training Manual		£22.70	___	£___

NOTE: MoF's Book 1, 3 and 10 have been superseded by Fire Service Manuals (listed below) and are no longer available

STATIONERY OFFICE FIRE SERVICE MANUALS

Fire Service Manual Volume 1 – Physics and Chemistry*		£18.40	___	£___
Communications & Mobilising		£16.45	___	£___
Fire Service Operations Volume 2 – Compartment Fire & Tactical Vent.*		£18.40	___	£___
Electricity		£16.05	___	£___
Firefighting Foam		£16.25	___	£___
Incident Command		£16.25	___	£___

*NOTE: Manuals marked with * include a ring binder*

BOOKLETS

Chair in Fire Law Inauguration Commemorative Brochure		£5.00	___	£___

IFE PUBLICATIONS

		Qty	Amount
A Guide to Fatal Fire Investigations *D. Leitch*	£12.35	___	£___
The Principles of Fire Investigation *R.A. Cooke and Rodger H. Ide*	£15.40	___	£___
Preliminary Certificate Study Book	£13.70	___	£___
Airports and Aircraft Fire Protection Fire Fighting and Rescue Techniques *R.W. Docherty* (New Expanded Edition)	£19.50	___	£___
Handbook for Fire Engineers (no binder) *P.G. Edgerley and P.G. Robinson*	£13.95	___	£___
Fire Technology – Chemistry and Combustion *D.M. Wharry and R. Hirst*	£11.10	___	£___
Fire Technology – Calculations *P.A.D. Sheen and A. Gray*	£6.40	___	£___

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Equal Opportunities *M.J. Penton*		£5.00	___	£___
Introduction to Total Quality Management *G. Southworth* (£4.75 OFF)		£12.25	___	£___
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Risk Assessment for the Emergency Services *R.A. Klein*		£16.25	___	£___
Marine Fire Studies *P. Cox*		£16.45	___	£___
A Political Analysis of the British Fire Service *L. Leckie*		£8.45	___	£___
(New) **Guidance on Acceptance of Electronic Locks to Doors Required for Means of Escape** *G. Shiel*		£9.00	___	£___
Active Fire Safety Systems *compilation of articles*		£25.00	___	£___
(New!) **Disasters and Emergencies: Managing the Response** *W.R. Tucker*		£16.00	___	£___

BOOKS AND ITEMS OBTAINABLE FROM THE IFE

Firefighter Manual of Trauma Care	£14.25	___	£___
Practical Fire Precautions	£79.00	___	£___
EuroFire 98 Proceedings CD-ROM	£40.00	___	£___
Ties (Black, Maroon or Navy)	£6.25	___	£___
IFE Plaques	£32.00	___	£___
Lapel Badges	£3.50	___	£___
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Golfing Umbrellas, Red & White, Sturdy	£23.55	___	£___
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Ladies Reefer Scarf	£9.00	___	£___

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NOTES FOR AUTHORS

This short article is a repeat of guidance given in the March 1997 issue of the Journal.

Authors are actively encouraged to submit papers for publication in the Journal. The work described must be original, not concurrently submitted to any other publication, and relevant to the readership of the Journal.

A paper can be in any of four forms:

- A technical note of about 1500 words, presenting preliminary details of significant developments or extensions of a previous paper.
- A 'standard' paper of 5000 words maximum. It should be written with the object of keeping members informed of advances in fire engineering.
- A practical paper of 3000 words maximum, covering matters of relevance to the fire community.
- A review paper.

Papers must be written in English. After the editing process, authors will have the opportunity of checking their texts at proof stage. Communications are invited on all papers published in the Journal

Submission of papers

Send four copies of the paper, along with a covering letter to: The Editor, Institution of Fire Engineers, 148 Upper New Walk, Leicester LE1 7QB, UK. Remember to keep a copy of the paper for yourself.

Text

Ensure that the text is typed, double-spaced, on one side of the paper. The text should start with an Abstract, as described below, and should include an Introduction and Conclusions demonstrating the relevance and practical value of the work. The title should include all the key words likely to be of value in later abstracting and referencing.

Any author whose paper has been word-processed on a computer is asked to send in a copy of the files on a 3.5" disk, Zip disk or CD-ROM as it will greatly reduce the work of typesetting. Documents may also be sent to us via e-mail as raw text or attached file. Attached files must be UUencoded and be sent via a MIME compatible mailer to: journal@ife.org.uk.

Word processing files generated on Word Perfect or MS Word are acceptable. Alternatively, files can be saved in plain ASCII text or rich text format (RTF). Images or graphics embedded in word processing documents are not usable; please supply them as separate files saved in one of the following formats – TIFF, EPS, GIF, BMP or JPEG.

Abstract

Precede the paper with a factual abstract. If the title of the paper cannot be comprehensive, begin the abstract with an indication of the subjects covered. State the object of the work, and the conclusions drawn, and indicate the essential parts of any new theory, treatment, apparatus or technique.

Symbols

If the paper has a substantially mathematical content start the text with a list of the symbols you have employed (both familiar and unfamiliar). This helps both the reader and the printer. SI units of measurement must be used.

Illustrations

Ensure that one set of black-and-white drawings/diagrams/ photographs is of suitable quality for reproduction in a professional journal, and attach a list of captions for all illustrations. Authors will be asked to re-draw computer-generated figures if the lines and/or arrow-heads are too thin to reproduce in print.

References

References should be numbered and tabulated at the end of the paper in this standard form:

- Names and initials of authors, typed in capitals.
- Title of paper or work
- Full name of the journal or conference or name and place of publisher.
- Year of publication; volume number, where appropriate; first and last page numbers.

Refereeing

Papers to be refereed.

Copyright

It is the author's responsibility to obtain the permission of all relevant parties for publishing the information and figures contained in the paper.

I'd like to draw particular attention to two headings – the Abstract and Refereeing.

Abstract This should be concise and should convey the contents of the paper, including its conclusions. It should avoid jargon or forward references to the text because it must be capable of standing alone; our abstracts have and will increasingly be used by information retrieval organisations for inclusion in world wide databases. This is one of the means by which specialist information is made available internationally and we too will be able to make use of this facility.

I have deliberately avoided setting a length to the abstract. Many organisations say between 150 and 200 words long and written assuming that the reader has some knowledge of the subject but has not read the paper. I would ask authors to keep in mind the enormous range of our readership – from students just starting on their career to experts in specialist fire engineering activities – and to write their abstract so that it can be understood by all. On occasion this may mean that the abstract is extended but this should prove beneficial in keeping our readership informed over a broad front. Well written abstracts are also of enormous help in deciding whether and by whom a paper needs refereeing.

Refereeing The purpose of refereeing is to ensure that the contents of a paper are correct and, if it is a research paper, that it is the original work of the author with other relevant work given due credit. There is also the bonus that the quality of argument can be improved under expert guidance and the author given a preview into his readership's reactions.

Refereeing is carried out independently by two people, chosen for their expertise in the relevant field. If the referees disagree in their response, a copy of the paper is sent to a further person for a third independent opinion. Comments are considered by the Editorial Board which takes the final decision on whether or not to publish.

If papers are expressions of personal opinion, or accounts of how things are done, then it is unlikely that they will be refereed.