THE INSTITUTION OF FIRE ENGINEERS
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SYLLABUS FOR IFE LEVEL 4 CERTIFICATE IN FIRE SCIENCE AND FIRE SAFETY. (500/5924/5)

(FORMERLY KNOWN AS THE MEMBERSHIP SYLLABUS.)

The IFE Level 4 Certificate (Membership) syllabus has been prepared as a series of objectives with the intention that students can acquaint themselves satisfactorily with the required subject matter. It is intended to be a **guide** to your study plan. You should be aware that questions may be included in examinations from time to time which may not arise directly from this syllabus but which will reflect current thinking and new developments in Fire Engineering.

Details of the IFE Level 4 Certificate qualification in Fire Science and Fire Safety can be found at:-

http://www.accreditedqualifications.org.uk/awardingbody/qualifications/The+Institution+of+Fire+Engineers+qualifications.seo.aspx

Note: The IFE examination syllabus is progressive and candidates are reminded that the IFE Level 4 Certificate (Membership) Examinations will have regard to the knowledge contained within the former Preliminary, Intermediate and Graduate syllabuses.

The guide to the study materials required for the examinations in this syllabus is contained in the reading list published on the Institution's website. However, candidates must ensure they are well prepared by reading widely since studying only the material on the reading list will not be sufficient for this particular examination.

Candidates are required within five examination years to obtain a pass in **four** papers, two **mandatory** and two **optional**.

Paper 1 – Fire Engineering Science (Mandatory). Accredited Unit Y/502/3125.

1. Hydraulics

1.1 Carry out calculations based on the Bernoulli equation

1.2 Describe the Venturi effect

1.3 Explain how Venturi meters, Pitot tubes and vee notch weirs are used to evaluate flow rates, pressure and pressure drops

1.4 Carry out calculations for flow rate using the Venturi meter

1.5 Calculate the flow of water through open channels

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1.6 Calculate forces exerted by a jet hitting a flat or inclined surface

2. Combustion

2.1 Describe a flame or combustion in terms of chemical reactions and discuss the factors which influence the speed of the reaction

2.2 Describe the combustion process as a chain mechanism including the effects of temperature and pressure on rate of reaction

2.3 Describe the ignition processes which initiate the combustion reaction

2.4 Describe the combustion of solids, liquids, gases, transient dust and vapour phases as a process

2.5 Describe how the combustion process can be terminated

2.6 Define the following terms in relation to the chemical reactions:-

a) Limits of flammability
b) Diffusion flames
c) Premixed flames
d) Cold flames
e) Self ignition temperature
f) Flash over
g) Flash back
h) Backdraught

2.7 Describe how the necessary fuel/air mixture ratio may be achieved by diffusion

2.8 Describe how the necessary fuel/air mixture ratio may be achieved by pre-mixing

2.9 Explain how dust and spray explosions can occur

3. Special combustion processes

3.1 Define the terms:-

a) Spontaneous heating
b) Spontaneous ignition
c) Spontaneous combustion

3.2 Describe the term oxidation and give examples of high temperature oxidation processes

3.3 Discuss the hazards of flammable materials that contain their own means of oxidation

3.4 Differentiate between high and low explosives and explain the classifications of explosives as follows:-

a) Detonators
b) Propellants
c) Initiators
d) Deflagrators

4. Fire dynamics

4.1 Describe the incubation and ignition stages of a fire – materials, thermal inertia, radiative heat transfer to fuel surfaces

4.2 Early growth

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Surface spread of flame (wind aided/wind opposed) floors/walls/stairs/trench effect, fuel array geometry and radiative spread

4.3 Heat
Release rate/ square metre of material/item/whole fire, fire calorimetry

4.4 Flame and smoke plumes
Flame height versus heat release, plume height, cold air entrainment, basic smoke movement, ceiling layer formation, layer temperature versus radiant

4.5 Ventilation
Bi-directional flow through an opening, ventilation control of fires in compartments, layer formation, smoke outflow through an opening

4.6 Flashover
The effects of fire position (centre of room/near wall/in corner) ceiling height, thermal properties of wall and ceiling materials. Heat release rates for flashover, time to flashover

4.7 Fire growth rates
Time squared fires (slow/medium/fast/ultra fast), factors affecting the growth of fire

4.8 Steady state phase
Duration of burning and fire load (Laws' Law)

4.9 Decay phase
Effect of fuel or air depletion. Automatic/manual extinction

4.10 Preparing a quantitative fire growth curve based on all previous sections

5. Effects of heat

5.1 Explain the production of heat by the following processes:-

a) Friction
b) Combustion of gases
c) Passages of electric current
d) Chemical reactions

5.2 Describe how the effect of heat changes the strength of materials

5.3 Describe the effects of fire on the following structural materials:-

a) Timber
b) Brick
c) Stone
d) Reinforced concrete
e) Cast iron
f) Steel
g) Aluminium
h) Glass

5.4 Describe the principles of the laboratory tests which may be used to assess the flammability and fire resisting properties of materials and elements of structure.

5.5 Discuss the factors which influence the severity of a fire within a room or building

5.6 Define the terms Fire Load and Fire Load Density and using calorific values, carry out simple calculations

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6. Principles of heat and combustion sensitive detection devices

6.1 Describe in detail the operating principles of:-

a) Ionisation detectors
b) Optical detectors
c) Heat detectors
d) Combustion detectors
e) Radiation detectors
f) Flame detectors

6.2 Demonstrate knowledge of the use and effectiveness of the detectors listed in 6.1 according to the risk to be covered and their reliability

6.3 Describe the operating principles of thermocouples and thermistors

7. Electricity

7.1 Describe in detail the principles of generation, transmission, distribution and utilisation of electrical energy

7.2 Define the terms earthing and bonding and explain why these terms are important with regard to electricity

7.3 Describe the principle of protective measures utilised to safe guard individuals and equipment in conjunction with electrical energy

7.4 Detail protective arrangements for the use of electricity in atmospheres that are flammable or contain explosive dusts

7.5 Describe static electricity, its generation, storage and discharge

7.6 Detail the precautions necessary to minimise the generation, accumulation and discharge of static electricity particularly in flammable atmosphere

8. Special hazards

8.1 Detail the methods of internal and external storage of hazardous substances which are flammable, toxic, corrosive, radioactive or a combination of such hazards

8.2 Show an understanding and knowledge of the physiological effects of hazardous substances with particular reference to their toxicity

8.3 Describe the means by which toxic material can enter the body

8.4 Describe the nature, properties, industrial processes, the precautions to be taken in handling and storage, the signs and symptoms of poisoning, the flammability of the substances used in the process, the correct medical treatment to be applied, their reaction to fire fighting media and to other substances and hazards of the following substances:-

a) Fats and waxes
b) Paints and varnishes
c) Coal and coke
d) Petroleum spirit and fuel oils
e) Liquefied petroleum gases
f) Cellulose materials
g) Plastics
h) Metals
i) Animal and vegetable oils
j) Radioactive materials

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k) Cryogenic substances
l) Explosives
m) Organic Solvents

8.5 Outline the hazards associated with:-

a) Coal gas and natural gas installations
b) Petroleum and oil installations
c) Chemical plants
d) Liquefied petroleum gas installations
e) Pipelines convey flammable gas or liquids

Paper 2 – Fire Safety (Mandatory). Accredited Unit D/502/3126.

1. Fire safety practice

1.1 Identify the principal requirements for the prevention of fire in the following classes of premises and places:-

a) Multi-story car parks
b) Shopping precincts and malls
c) High rise tower blocks
d) Hospitals
e) Residential care establishment for the elderly, young or disabled
f) Schools and universities
g) Sports stadia
h) Petroleum installations and chemical plants
i) Residences of multiple occupation
j) Flats or maisonettes (apartments)
k) Historic buildings
l) High bay storage warehouses and other warehousing with large storage areas
m) Farm buildings
n) Tank farms
o) Temporary buildings and structures
p) Buildings being built, altered or demolished
q) Complex and fire engineered buildings

2. Principles of means of escape from fire

2.1 Define the principles of means of escape (egress) from fires and apply them in particular to:-

a) Residential premises
b) Places of public entertainment
c) Industrial and commercial premises
d) Large city centre complexes and shopping malls

2.2 Outline special arrangements that may be needed for means of escape for the young, the old and the disabled

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3. Installation using extinguishing media

3.1 Describe in detail the design features, installation, maintenance and operation of the following:-

a) Sprinkler Systems
b) Drenchers
c) Water spray projectors and water mist systems
d) Rising mains
e) Foam systems
f) Gas/vapour systems
g) Dry powder systems

3.2 Discuss the particular risks for which the systems listed in 3.1 above would be appropriate

4. Fire detection systems

4.1 Describe in detail the design features, installation, maintenance and operation of the following:-

a) Heat detectors
b) Smoke and combustion product detectors
c) Flame detectors
d) Flammable vapour and other vapour detection systems

4.2 Discuss the particular risks for which the systems listed in 4.1 above would be most appropriate

5. Explosion detection and control systems

5.1 Describe in detail the design features, installation, maintenance and operation of the following:-

a) Explosion detection systems
b) Explosion venting systems
c) Explosion suppression systems
d) Control of flammable atmospheres

6. Fire alarm systems

6.1 Describe in detail the design features, installation, maintenance and operation of Automatic Fire Detection Systems including:-

a) Types of system
b) Definitions of a detector
c) Classifications of detectors
d) Success or failure of operation
e) Automatic Fire Detectors – Radio Systems
f) Automatic Fire Detection – Detector Circuits
g) Control and indicating equipment
h) Detector positions
i) Manually Operated Fire Alarms

6.2 Discuss the particular risks for which the systems in 6.1 would be appropriate

7. Installations - general

7.1 Describe the procedures for the commissioning of fixed installations

7.2 Outline the procedures for the testing, maintenance and regular inspection of fixed installations

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8. General fire safety

8.1 Discuss the physiological, behavioural and psychological effects of people presented with a fire situation

8.2 List emergency procedures for the safe evacuation of people from a fire situation

8.3 Show knowledge of how the behavioural aspects of people in fire can be used to plan means of escape and evacuation procedures

8.4 Show knowledge of the behaviour of people in a fire and demonstrate how this can adversely affect evacuation and means of escape

8.5 Discuss detailed procedures for training staff in fire safety

8.6 Discuss methods of improving fire safety in the community and increasing public awareness and perception of general fire safety matters

9. Legislation and codes of practice

9.1 Explain the principal requirements of fire safety, fire precaution and fire prevention legislation, together with their attendant Codes of Practice, rules, regulations and recommendations, which operate in candidates' own countries and which apply to the list of premises and places in 1.1 above

Paper 5 – Strategic Human Resource Management in Fire and Rescue Services (Optional). Accredited Unit K/502/3128.

1. Planning, control and review

1.1 Detail the responsibilities of the manager in connection with the needs of customers and suppliers, external and internal to the organisation

1.2 Describe how planning methods can be adopted to achieve productive results

1.3 Explain how the keeping of records, relating to work methods and health and safety, can provide a basis for continuous improvement

1.4 Describe how leadership of individuals and team members can influence control

2. Quality management

2.1 Identify the role of the manager in the quality management cycle

2.2 Describe how to implement planning systems and procedures, which seek to achieve quality outcomes

2.3 Explain how to monitor and control quality and take necessary steps to improve it.

2.4 Discuss how leadership support of individuals and teams can be provided

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3. Use and control of resources

3.1 Describe the role of the manager to use resources efficiently:-

a) The concept of effective resource management
b) How poor resources can affect performance
c) Information and communication systems in relationship to resource control
d) Analysis techniques using past data to predict future resource requirements
e) Typical resource problems and how they might be overcome

4. Development of personal management style

4.1 Identify the support you would require implementing an action plan for self-development

4.2 Describe why work is delegated, how to delegate and how to monitor performance

4.3 Discuss how to assess available information to ensure effective decision taking

4.4 Recognise negative forms of behaviour that are likely to occur if team members are not kept well informed

4.5 Draw up a chart for an organisation management structure and lines of command

4.6 Define the responsibilities and accountabilities of one of those to whom they report

5. Recruitment and selection

Within the role of manager

5.1 Specify the information required to write a job description and person specification

5.2 Identify the factors, which should be considered in establishing personnel requirements, how and with whom they should be discussed

5.3 Discuss candidate feedback into the process, with provision for further development and reviews and improvement of the selection process

6. Planning and controlling the work of teams and individuals

6.1 Explain the importance of equal opportunities in Human Resource Management

6.2 Detail a work plan, which is consistent with organisational objectives and policies

6.3 Describe a system, which encourages team members to become involved in work allocation

6.4 Identify a method of minimising the impact of cost and time in changes to work situation

7. Managing the performance of teams and individuals

7.1 Review a disciplinary and grievance procedure, which includes recording mechanisms and comment on the authority and responsibilities of the manager within the procedure

7.2 Discuss a specific incident in which a team member had a problem which was causing poor work performance and describe how well it was handled

8. Meetings and decision making

8.1 Detail the functions and limitations of meetings, decision making within the role of a first line manager

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8.2 Discuss the information required in respect of major decisions made by managers, commenting on the importance of accuracy, relevance and sufficiency of that information

8.3 Analyse a given information system and make recommendations to improve it

8.4 Describe different types of meeting explaining the purpose of each and identify typical objectives for each type

8.5 Explain different styles of leadership and describe typical scenarios encountered in meetings where they could be used

8.6 Describe decisions which are best made during a meeting of managers and explain why

9. Human Resources

9.1 Describe in detail the manager's role in relation to:-

a) Job analysis
b) Job evaluation
c) Employee relations
d) Training and employee development
e) Morale
f) Health, Safety and Welfare

Paper 6 – Fire Service Operations (Optional). Accredited Unit H/502/3127.

1. Command and Control

1.1 Discuss in detail the purpose of pre planning and demonstrate an ability to produce a pre plan for any specified emergency

1.2 Describe in detail and discuss the principles for general control, fireground tactics and fireground strategy

1.3 Explain in detail the need for evacuation at fires, emergency incidents and major disasters and discuss how this can be achieved

1.4 Detail the strategy and tactics involved in rescue work and discuss how they are used in practice to accomplish efficient rescues

1.5 Describe in detail and discuss procedures for ensuring the safety of both personnel and public

1.6 Explain the objectives of ventilation at fires and describe in detail the principles involved

1.7 Discuss the aims of salvage/damage control operations and describe in detail the principles and technicalities involved

1.8 Discuss the techniques of fire investigation into the cause, and damage that is inflicted by fire, emergency incident or major disaster

1.9 Show an understanding of the indirect socio-economic consequences of fires, other emergency incidents and major disasters

1.10 Describe the inter relationship of logistics operations and technical support at incidents

1.11 Discuss in detail environmental effects and control measures in relation to fires

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1.12 Describe in detail the different types of firefighting media and equipment

1.13 Discuss in detail the firefighting procedures and tactics in fires involving hazardous materials.

2. Firefighting Vehicles and Appliances

2.1 Discuss the design, construction and operation of any vehicles to be used for fire and rescue purposes

2.2 Demonstrate an understanding of how a specification for an emergency vehicle or appliance is produced

2.3 Discuss the design, construction and operation of fire boats and other water-borne appliances

2.4 Discuss the use of other modes of transport that may be utilised for emergency or firefighting purposes

2.5 Demonstrate an ability to produce outline research proposals for the investigation of problems that may be encountered in the design, construction and operation of appliances, the equipment they carry and the incidents they may attend

2.6 Demonstrate an ability to programme an equipment design and evaluation system and to implement the introduction of successful equipment

3. Incidents Involving all types of Transport: Road, Rail (including underground and funicular railways) Shipping and Air

3.1 Discuss in detail firefighting and emergency procedures for transport incidents including:-

a) Incidents at stations, interchanges, docks and airports
b) Incidents in populated areas
c) Incidents in rural or remote areas
d) Rescue
e) Special hazards which may be encountered

3.2 Describe the design and construction of the following type of ships:-

a) General cargo
b) Container
c) Chemical and gas carriers
d) Bulk carriers
e) Passenger vessels including liners
f) Warships

3.3 Explain the measures incorporated into ships to provide fire detection and protection

3.4 Demonstrate an understanding of the concept of stability and outline the procedures for ensuring stability during firefighting operations

3.5 Outline the factors relevant to ship firefighting both in ports and at sea

3.6 Describe the general features of railways

3.7 Describe the types, design and construction of trains and rolling stock

3.8 Discuss in detail firefighting and emergency procedures for railway incidents

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4. Communications

4.1 Discuss in detail the importance of good communications for both emergency and non-emergency purposes within the modern fire service

4.2 Discuss the planning, design, operation and functions of control centres suitable for emergency services

4.3 Discuss the methods by which stations can be alerted from a control centre

4.4 Describe the various types of radio schemes and systems for fire service general and fireground use

4.5 Discuss the use of computer aided mobilising systems

4.6 Discuss possible future developments in the use of technologically advanced systems for mobilisation and communications

Paper 7 – Aero Fire Studies (Optional). Accredited Unit H/502/3127.

1. Provision for fire fighting and rescue facilities at airports and airfields

1.1 Explain in detail the concepts of critical areas and control

1.2 Outline the training requirements of rescue and firefighting personnel

1.3 Outline the criteria to be taken into account when designing and providing airport fire stations

1.4 Explain in detail the specification and considerations to be taken into account when designing and providing new airport fire appliances

2. Fire protection of airport buildings

2.1 Explain the determination of the size of an airport terminal building and its facilities

2.2 Discuss the design features of air freight and cargo terminals

2.3 Explain the classification and protection of aircraft hangars

3. Emergency planning and procedures

3.1 Explain the purpose of pre-planning for emergencies

3.2 Outline the need for emergency planning within the immediate community

3.3 Detail the role of each emergency service at the scene of an aircraft accident

3.4 Discuss the problems of command and control in the early stages of major civilian aircraft accidents

3.5 Detail the principles of good site management at the scene of a major aircraft accident

3.6 Explain the strategic, tactical and operational levels of command and control, giving examples of each

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4. Post accident procedures

4.1 Discuss the need for post accident counselling for rescue personnel

4.2 Show an understanding of the need to preserve the site and evidence and the gathering of other evidence

4.3 Discuss the removal and collation of personal effects and papers

4.4 Discuss the removal and moving of bodies including the recording of positions and locations

4.5 Detail the factors to be taken into account in setting up a temporary morgue

4.6 Describe the hazards of handling human remains at the site of a major aircraft accident and at the temporary morgue

4.7 Describe the health and safety legal considerations to be taken into account when planning and establishing a temporary morgue

4.8 Describe Critical Incident Stress in the context of rescue workers and ways in which the effects can be minimised

5. Training

5.1 Discuss how the lessons learned from aviation disasters in a country can be disseminated: -

a) Nationally
b) Internationally

5.2 Describe the various methods of training available to test contingency and pre-determined emergency plans and how they can be improved

5.3 Discuss the salient points of organising a large scale exercise involving all responding emergency services to major aircraft disasters

6. Media

6.1 Discuss the role of a media centre at a major incident and the liaison agreements with the emergency services

6.2 Discuss liaison with the media before, during and after a major incident

6.3 Detail the factors to be considered in running a press conference during a major incident

7. Environmental awareness

7.1 Discuss the prevention of pollution of water courses and rivers by collection and impounding of firefighting run-off water

7.2 Discuss the environmental hazards associated with firefighting foams

7.3 Detail the hazards of vapour cloud/toxic gas cloud off site during and after fire or other operations

8. Heliports

8.1 Define and show an understanding of the terms ‘obstacle limitation surfaces’ and ‘transitional surfaces’

8.2 Detail the main features to be considered in the designing of off-shore heliports

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8.3 Explain in detail the concept of critical area as applied to helicopters

8.4 Discuss response times for firefighting and rescue personnel at surface level and at elevated heliports

Paper 8 – Fire Investigation (Optional). Accredited Unit M/502/3132.

1. Effects of structure and their contents

1.1 Discuss the effects that the contents of a building have on a fire, including:-

a) Traditional furniture
b) Modern furniture and furnishings
c) Carpets and rugs

1.2 Discuss the concept of fire load density

1.3 Describe the principles of Heat Release

1.4 Define Law's Law and express it as a mathematical formula

1.5 Apply Law's Law to practical situations

1.6 Describe how ventilation in a building may affect a fire

1.7 Describe the effect that the structure of a building has on a fire

2. Effects of occupancy and firefighting

2.1 Discuss the effects that occupancy can have on a building involved in fire, with particular reference to the following:-

a) Factories
b) Chemical works
c) Hospitals and residential homes
d) Schools
e) Ships

2.2 Outline the effects of firefighting on the structure and contents of a building involved in fire

3. Management of fire investigation

3.1 Describe the communication pathways that are appropriate in the management of fire investigation

3.2 Discuss the organisational aspects of fire investigation and produce a diagram of alternative fire investigation procedures

3.3 Discuss the training of fire investigation officers and the contents and design of suitable courses

3.4 Detail the personal safety factors that fire investigation officers need to take account of when carrying out fire investigation

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4. Collection of information

4.1 Detail the type of information that is required by the following parties:-

a) Fire service
b) Police
c) Coroner
d) Insurance

4.2 Outline the ways and methods used to collect information and describe the advantages and disadvantages of each method

4.3 Describe the recording of information relating to the positions of movable objects and fire seat location

4.4 Define the terms 'lay witness' and 'expert witness'

4.5 Discuss the effective interviewing of a witness

5. Locating the seats of fire

5.1 Discuss the following factors that affect the accuracy in determining the location of a seat of fire:-

a) Size of fire
b) Flashover
c) Smouldering
d) Fire fighting procedures
e) Localised fuel load
f) Backdraught

5.2 Describe in detail the physical signs that can illustrate the general locality of a seat of fire and discuss their relative merits with particular reference to:-

a) Low level burning
b) High level burning
c) Smoke spread
d) Wall patterning
e) Glass fracture, melting, discolouration or staining
f) Melting and distortion of metals
g) Melting and degradation of plastics
h) Burning effects of timber
i) The arrow theory

5.3 Describe and discuss the value of the instrumental aids that are available to the fire investigator to detect hydrocarbons

5.4 Describe in detail the indirect methods of locating the seat of fire with particular reference to:-

a) Observations of witnesses
b) Reversal of fire fighting
c) Points of entry and exit
d) Position of bodies
e) Knowledge of materials present

5.6 Discuss the term 'apparent seats of fire' and be able to group them under specific headings

5.7 Explain the need for excavation of the site

5.8 Outline the need to reconstruct the site

5.9 Describe the study of pre-fire events

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5.10 Explain the term ‘radius of error’

5.11 Describe the approach to the excavation of the fire seat with particular reference to:-

a) Extraneous items and materials
b) Fire accelerants
c) Liquid burn patterns
d) Solid fire accelerants

5.12 Describe the approach to general excavation of the site

6. Deductive evidence at the scene of fire

6.1 Discuss how glass can provide evidence to assist in the investigation of a fire

6.2 Discuss how smoke records can provide evidence to assist in the investigation of fire

6.3 Describe how evidence can be gained from instrument marks, footwear impressions and tyre marks (in cases of vehicle evidence)

6.4 Discuss the use of trace evidence found at fire scenes including directional evidence

7. Fires involving fatalities

7.1 Explain the fundamental features of an investigation when a person dies as a result of fire

7.2 Describe the ways in which the deceased may be identified

7.3 Discuss the evidence that needs to be collected to establish the location of death and when and how the deceased died

7.4 Show an understanding of how people behave in fires

7.5 Discuss the factors which would lead an investigator to recognise a death in fire as a murder or suicide

7.6 Display an understanding of basic medical terminology that may be encountered during an investigation and subsequent post mortem

7.7 Describe the points to consider when removing bodies at fire scenes

8. Explosives and explosions

8.1 Explain the types of explosions that may occur

8.2 Describe the term ‘High Explosives’

8.3 Explain the term ‘Condensed Phase Deflagration’

8.4 Explain the term ‘pyrotechnics’

8.5 Describe the term ‘dispersed explosion’

8.6 Explain the term ‘ventilation induced flashover’

8.7 Describe container explosions

8.8 Discuss the investigation of explosions

8.9 Outline the materials that can be involved in explosions

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8.10 Explain the preservation of evidence of an explosion and outline a procedure for searching for a high explosive device

9. Vehicle fires

9.1 Discuss in detail car fires and their causes with particular reference to:-

a) Moving car fires
b) Accident induced car fires
c) Stationary car fires
d) Location of the seat of fire

9.2 Describe the examination of the vehicle for evidence

9.3 Discuss in detail lorry fires and their causes with particular reference to:-

a) Moving vehicle fire
b) Accident induced fire
c) Fires in stationary Lorries

10. Heating, cooking and lighting

10.1 Discuss the possible causes of ignition from the following:-

a) Open fires
b) Fixed gas fires
c) LPG cabinet heaters
d) Paraffin heaters
e) Radiant heaters
f) Electric reflector and fan heaters
g) Night storage heaters

10.2 Discuss the causes and recognition of fires in cooking appliances

10.3 Discuss the possible causes of ignition in electrical lighting systems and lighting systems that involve naked flames

11. Recognition of types of fire

11.1 Describe the characteristics of fires with different origins

11.2 Explain the reasons for suspecting arson as a cause of fire from the general circumstances

11.3 Explain the reasons for suspecting arson at or after the investigation of the scene of fire

11.4 Discuss the types of persons who set fires and explain the classification of them into certain groups

12. Physical processes in fire

12.1 Describe the physical processes involved in a fire with particular reference to:-

a) Heat, temperature and the states of matter
b) Heat transfer
c) Flame height
d) Upper layer temperature
e) Radiative feedback

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13. Electricity

13.1 Show an understanding of the ways in which heat can be achieved in a circuit

13.2 Explain how static electricity can become a possible source of ignition

13.3 Discuss the recognition of electrical causes of fire

14. Chemistry of fire and flammable materials

14.1 Outline the chemistry of fire and define the following terms:-

a) Stoichiometric mixture
b) Flammability limits
c) Flash point and fire point
d) Radiation induced flashover
e) Flames
f) Smouldering combustion
g) Spontaneous combustion
h) Spontaneous ignition temperature
i) Autoignition temperature

14.2 Outline the properties of the following common flammable materials:-

a) Methane, propane and butane
b) Acetylene
c) Hydrogen
d) Petroleum products
e) Paraffin
f) White spirit
g) Diesel oil
h) Ethanol (alcohol), methylated spirit, methanol (methyl alcohol) and isopropanol (2-propanol)
i) Plastic and chemicals that are used in plastic manufacturing industries
j) Rubbers (natural and synthetic)
k) Carbohydrates
l) Cellulose
m) Proteins
n) Fats
o) Wood

14.3 Show a detailed knowledge of the principles of estimation of temperature attained

15. Laboratory examinations

15.1 Describe the taking and examination of fire debris samples with specific references to:-

a) The chain of continuity for law
b) Avoidance of contamination

15.2 Discuss the levels of involvement of the laboratory with regard to incendiary devices

15.3 Explain the principles of laboratory examination of the following:-

a) Containers
b) Clocks and watches
c) Hair and clothing
d) Paint
e) Other articles and evidence that may be found at a fire scene

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16. Matches

Describe in detail the main aspects of interest in the study of matches and show knowledge of their physical and chemical properties in relation to establishing the causes of some fires

17. Laboratory analysis

Explain the principles of laboratory analysis of material and samples collected at the scene of fire with particular references to:-

a) Fuels and fire accelerants – hydrocarbons
b) Fuels and fire accelerants – non-hydrocarbons
c) Toxic combustion products

18. The expert witness

18.1 Define the term expert witness

18.2 Explain the division of evidence into functional parts

18.3 Explain the rules against hearsay and the use of other people's evidence

18.4 Describe how expert evidence is disclosed in criminal and civil court proceedings

Paper 11 – Civil Emergency and Disaster Management for Fire and Rescue Services (Optional). Accredited Unit A/502/3134.

1. Local authority contingency planning

1.1 Describe the roles of local authorities and central government in civil emergencies and explain the need for liaison between them

1.2 Describe the functions of an Emergency Planning Officer (or equivalent)

1.3 Detail the legal obligations of the Local Authority in dealing with major civil emergencies

1.4 Discuss the planning principles involved in mitigating the effects of civil emergencies

1.5 Describe what is meant by an integrated approach to emergency management and discuss its practicalities

1.6 Detail the responsibilities of local authorities and the processing industry with regard to large scale chemical emergencies

1.7 Explain the term 'Combined Response' and list the principles necessary to establish effective 'Call Out' arrangements

1.8 Produce a model for a co-ordinated approach to disaster management and outline key accountabilities

1.9 Discuss the parameters of major civil emergencies and disasters and whether a definition should be prescribed

1.10 Detail the main differences in planning for wartime and peacetime contingencies

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1.11 Discuss the merits of computer modelling in contingency planning for a large processing plant

1.12 Define 'Emergency Planning' and highlight the core aspects

1.13 Discuss the core aspects of a contingency plan for a local authority when dealing with a major civil disaster

1.14 Discuss the advantages of contingency planning compared with other forms of preparation

1.15 Describe the role of a civil emergencies adviser

1.16 Discuss whether there should be a statutory duty for local authorities to undertake civil emergency planning. Describe the advantages and disadvantages of such a duty

1.17 Detail other government departments or agencies which should or could be involved in responding to the following emergencies and describe their appropriate roles:-

a) Rail accidents
b) Aircraft accidents
c) Chemical accidents
d) Coastal or inland waterways pollution incidents
e) Severe storms

2. Disaster management

2.1 Detail the role of the police, and other emergency services at the scene of a major incident

2.2 Discuss the problems of command and control in the early stages of a major civil disaster

2.3 Detail the principles of good site management at the scene of a major civil disaster

2.4 Explain the strategic, tactical and operational levels of command and control and give an example of each

2.5 Describe the relevance of risk assessment in managing major civil emergencies and highlight the significant factors involved

2.6 Discuss the principles of co-ordination between local authorities and the statutory emergency services at a civil disaster

2.7 Describe the 'Lead Department' approach to disaster management as applied by government and detail the function of Regional Emergency Committees (REC's)

2.8 Discuss the role of government in responding to an international disaster overseas

2.9 Describe the operational difficulties that emerge in the early stages of disaster response where an act of terrorism is suspected

2.10 Discuss the sub-cultures associated with disasters

2.11 Define the term 'disaster'

2.12 Detail the phases of disaster and explain the interaction of the agencies involved

2.13 Describe the various communications options available in a major disaster/civil emergency and the means for insuring their availability

2.14 Describe acts of terrorism incidents

3. Training

3.1 Discuss how the lessons learned from disasters in a country can be disseminated

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a) nationally
b) internationally

3.2 Describe the various methods of training available to test contingency plans and how these may be improved

3.3 Describe the key training topics which should form the core of successful planning objectives in disaster preparedness

3.4 Describe the factors that need to be considered when undertaking a Cost Benefit Analysis of a large scale exercise compared to other forms of training

3.5 Detail the methods of training for the strategic, tactical and operational levels of command and comment of their suitability

3.6 Discuss the salient points of organising a large scale exercise involving a local authority and other agencies in responding to a major aircraft disaster

3.7 Detail the safety considerations to be given to the management of a major incident and the implications for training

4. Voluntary assistance

4.1 Detail the role of the voluntary organisation in the primary response to major civil emergencies

4.2 Discuss how the contribution of volunteers can be maximised during the various phases of disaster

4.3 Detail the principles of good site management at the scene of a major civil disaster in co-ordinating the activities of voluntary and other support agencies

4.4 Show by schematic means the core aspects in which organised volunteers can assist the statutory authorities involved in disaster response

4.5 Describe how the voluntary agencies can optimise their skills and resources in dealing with a civil emergency lasting several weeks

5. Support for Victims and Rescuers

5.1 Discuss the social impact of disasters and discuss the means of control and mitigation

5.2 Describe the effects of disasters on communities and how this can be eliminated

5.3 Detail how communities can be helped in the recurring phase of disasters and whether local authorities should take the lead role

5.4 Discuss how rescuers can be affected by disasters

5.5 Explain the difficulties in dealing with the victims of a major civil disaster remote from the centre of the population

5.6 Describe the functions of the Police Casualty Bureau and identify any overlap of function which could take place

5.7 Define ‘Post Traumatic Stress Disorder’ and explain how the public and rescuers become affected by it

5.8 Define ‘Critical Incident Stress’ in the context of rescue workers and describe ways in which the effects of it can be minimised

5.9 Explain the “Bellwin” scheme in relation to the financial recovery of communities

5.10 Describe the difficulties that can emerge in establishing a Disaster Fund

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5.11 Describe the direct and indirect losses to the community that can occur following a major civil emergency

6. Information and the media

6.1 Describe the role of the media at major disasters and the methods you would use to optimise their use

6.2 Discuss liaison with the media before, during and after a major disaster

6.3 Describe the role of the Media Centre at a major incident and the liaison arrangements with the emergency services

6.4 Describe the role of the Press Officer within the local authority and how best to optimise this as a resource

6.5 Detail the role of the Central Office of Information (COI) in supporting local press liaison officers

6.6 Describe the operational logistics of the mass media at a major incident and appropriate control of their attendance

6.7 Explain the means of self regulating the media to minimise the effects on a traumatised community

6.8 Detail the immediate needs of the media in the early stages of civil disasters

6.9 Detail the factors to be considered in running a Press Conference during a major disaster

7. Victim identification and recovery

7.1 Describe the methods used to identify dead bodies. Discuss the relative merits associated with each

7.2 Describe the role of the forensic scientist in the identification of bodies

7.3 Detail the factors to be taken into account in setting up a temporary mortuary

7.4 Describe the role of the coroner (or other appropriate legal officer) in disaster work and the legal powers required to preserve evidence

7.5 Describe the hazard of handling human remains at the site of a disaster and at the temporary mortuary

7.6 Detail the role of the embalmer/funeral director in a mass disaster

7.7 Discuss the advantages and disadvantages of relatives viewing the remains of victims of a mass disaster

7.8 Describe the role of the pathologist in a disaster

7.9 Discuss the importance of understanding religion, race and culture when discussing death with relatives of disaster victims

7.10 Discuss the work of forensic odontology at a major disaster and describe the problems that severely dismembered bodies present in identification

7.11 Describe the health and safety legal considerations to be taken into account when planning and establishing a temporary mortuary.

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