



THE INSTITUTION OF FIRE ENGINEERS
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2012 SYLLABUS FOR IFE LEVEL 3 DIPLOMA: FIRE SCIENCE OPERATIONS AND SAFETY 500/5923/3; FIRE SCIENCE AND FIRE SERVICE OPERATIONS 500/6215/3; OR FIRE SCIENCE AND FIRE SAFETY 500/6216/5.

The IFE Level 3 Diploma 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.

Note: The IFE examination syllabuses are progressive and candidates are reminded that the IFE Level 3 Diploma Examinations will have regard to the knowledge contained within the Level 2 Certificate and Level 3 Certificate 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.

Candidates are required to obtain a pass in **four** papers (one **mandatory** and three **optional**), in order to achieve the qualification.

Paper 1: Fire Safety (Optional). Accredited Unit H/502/3113.

1. Building construction

1.1 Interpret plans of building and recognise graphical symbols used for fire protection drawings

1.2 Detail the use to which the following building materials are put and comment on their behaviour in fire:-

- a) Timber
- b) Stone
- c) Brick
- d) Cement
- e) Concrete (reinforced and pre stressed)
- f) Metals
- g) Glass
- h) Building boards and building slabs
- i) Insulating materials
- j) Paint
- k) Plastics
- l) Sandwich panels

1.3 Define the following elements of structure, state their function and comment on their fire resistance:-

- a) Columns
- b) Beams
- c) Walls
- d) Floor
- e) Roofs
- f) Non load bearing walls and partitions

- g) Stairways
 - h) Doors
 - i) Windows
 - j) Roof lights
 - k) Ceilings
 - l) Sandwich boards
- 1.4 Describe the various types of heating, ventilation and air conditioning systems that are used in buildings and comment on the effects they may have on a fire and the fire suppression methods used in these systems.
- 1.5 Describe the methods of servicing buildings with electricity, gas, water, lifts and escalators
- 1.6 Describe the requirements and principles of:-
- a) Separating walls
 - b) Compartment walls and floor
 - c) Junctions formed by elements of structure
 - d) Protected shafts and protecting structures
 - e) Fire resisting doors and other enclosures
 - f) Space separation

2. Fire protection equipment

- 2.1 Outline the design features, installation, use, maintenance and operations of the following types of fixed installations
- a) Sprinkler systems
 - b) Drencher and Water Spray Projector Systems
 - c) Rising mains
 - d) Hose reels
 - e) Foam systems
 - f) Gas/Vapour Systems
 - g) Dry Powder Systems
 - h) Fire Detection Systems – Smoke, Heat and Flame
 - i) Electrically Operated Fire Alarm Systems – manual and automatic
- 2.2 Outline the use, siting and maintenance of portable fire extinguishers and extinguishing equipment

3. Fire safety practice

- 3.1 Describe the principles of means of escape in case of fire
- 3.2 State the principles of evacuation procedures that should be adopted in case of fire
- 3.3 Describe the use, siting and contents of fire notices
- 3.4 Outline methods of improving public fire safety
- 3.5 Define the basic principles that apply to the installation of:-
- a) Emergency lighting system
 - b) Fire venting systems
- 3.6 Students need to have detailed knowledge of the statutory responsibilities for fire precautions which may exist for any of the following classes of premises where they live. Some countries have adopted a process of risk management, others have a certification system: either is acceptable.

Where appropriate these responsibilities will include reference to structural matters, means of escape, fire detection, fire alarms, fire fighting equipment and fire routine.

The relevant statute should be quoted wherever possible.

- a) Commercial office premises
- b) Retail premises
- c) Factories and other places of manual work
- d) Places of public entertainment, including cinemas, theatres, dance halls and premises used only occasionally for these purposes
- e) Premises where alcoholic liquor is consumed
- f) Hotels and other relevant premises

4. Fire investigation

- 4.1 Discuss the effects of structures, occupancy and contents on a fire and state their significance to fire investigators
- 4.2 Demonstrate an understanding of how fire fighting operations may affect fire investigations
- 4.3 Outline the principal methods of gathering and recording information on the cause of fire including:-
- a) Taking of notes
 - b) Use of tape recorders
 - c) Photography
 - d) Visual recording systems
 - e) Plans and drawings
 - f) Interviewing witnesses
 - g) Excavation of site
- 4.4 Discuss the methods used to locate the seat of the fire including:-
- a) Physical signs illustrating the general location of the point of origin
 - b) Indirect methods of locating the seat
 - c) Apparent seats of fire
- 4.5 Explain the use of the following as deductive evidence at fire scenes:-
- a) Evidence from glass
 - b) Evidence from smoke records
 - c) Evidence from instrument marks
 - d) Evidence from footwear impressions
 - e) Vehicle evidence
 - f) Trace evidence
- 4.6 State the fundamental principles of fire investigation where a person dies as a result of fire including:-
- a) Identification of the deceased
 - b) When and how the deceased died
- 4.7 Outline the possible causes of ignition and problems from the misuse and malfunctions of heating, cooking and lighting equipment
- 4.8 Explain the characteristics of fires with different origins, i.e.
- a) Slow fires
 - b) Rapidly developing fires
 - c) Accidental fires from different causes
- 4.9 Outline the reasons for suspecting arson from the general characteristics of a fire and at or after the scene of investigation

Paper 2a: Fire Service Operations - International (Optional). Accredited Unit F/502/3118.

1. Firefighting techniques

In relation to general operations:-

1.1 Command and Control

- a) Discuss the purpose of pre planning for any specified emergency
- b) Explain the value of specific command references for officers, including Sector Command procedures
- c) Detail all types of fireground communications systems
- d) Describe principles for general control, fireground tactics and fireground strategy
- e) Explain the need for evacuation at fires
- f) Outline the strategy and tactics involved in rescue work
- g) Explain the objectives of ventilation at fires
- h) Describe the aims and principles of salvage/damage control

1.2 Fire development and extinguishment, including:-

- a) Methods of identifying different types of burning materials
- b) Various ways in which fire can spread within buildings and between buildings
- c) Explain in detail the principles, application and benefits of ventilation, including Positive Pressure Ventilation

1.3 Fireground Safety.

- a) Discuss the value of safety organisation at incidents and the duties that may be assigned to Safety Officers
- b) Describe in detail, in relation to specific risks, the various methods of attack, hazards to the environment and persons present, and appropriate practical procedures when attending incidents involving the following:-
 - Responding to emergency
 - i. Turning out
 - ii. Proceeding to incident
 - iii. Arriving/getting to work
 - Rescues from
 - i. Ice/unstable ground
 - ii. Lifts/escalators
 - iii. Sewers
 - iv. Silos
 - v. Trench/pits
 - vi. Collapsed structures
 - vii. Height
 - viii. Water including flooding
 - ix. Large animal rescue
 - x. Machinery (trapped persons)
 - xi. Tunnels
 - xii. Ships
 - Fighting Fires
 - i. Buildings
 - ii. High rise
 - iii. Chimneys
 - iv. Rural areas
 - v. Farms
 - vi. Using PPV
 - vii. In refuse
 - viii. Public entertainment venues
 - ix. Places of lawful detention
 - x. Petrochemical and pipelines
 - Transport Systems
 - i. Road
 - ii. Rail
 - iii. Air
 - iv. Marine

v. Helicopters

- Generic Hazards
 - i. Electricity
 - ii. Common industrial gases, including acetylene
 - iii. Chemical
 - iv. Biological
 - v. Confined spaces
 - vi. Civil or local disturbances
 - vii. Explosives
 - viii. Flashover/backdraught
 - ix. Asbestos
 - x. Industrial processes
 - xi. Radiological hazards

2. Mobilisation and communication

2.1 Detail methods of summoning personnel and transmitting call information and instructions to:-

- a) Fire stations
- b) Individuals at locations other than fire stations
- c) Mobile fire appliances

2.2 Describe equipment used and operating principles of brigade control rooms including the use of computer aided mobilising systems

2.3 Describe the radio systems using VHF, UHF and digital workings, and discuss their use both on and off the fireground

3. Pumps and primers

3.1 Describe in detail centrifugal and peripheral pumps including high-pressure pumps and state their advantages and disadvantages

3.2 Describe ejector pumps and state their areas of application within the Fire Service, together with their advantages and disadvantages

3.3 Define the following terms:-

- a) Duty point
- b) Volute
- c) Multi stage
- d) Guide vanes
- e) Cavitation

3.4 State the purpose and operation of anti-surge devices on high pressure hose reel tubing

3.5 Explain in detail direct and indirect cooling systems and state the advantages and disadvantages of both systems

3.6 Describe a typical hose reel system with the main pump feeding the hose reels at high or low pressure

3.7 Describe in detail the symptoms of faults that may occur:-

- a) When working from pressure-fed supply
- b) When working from open water

3.8 State the principles to be observed when controlling pump output where branchmen are involved, and the benefits and disadvantages of automatic pump controls

3.9 Describe the maintenance and servicing of pumps that should occur on returning from fire

4. Fire service vehicles

Demonstrate an understanding of the principal components, operations and functions of vehicles used by the fire and rescue services for fire fighting or special incident work undertaken by them. (**Note:** The term 'vehicles' includes container style vehicles, such as PODS and demountables, which may have one prime mover but a number of containers.)

Be able to specify the features of all types of fire and rescue vehicles, including the following:-

- 4.1 A pump appliance having an integral pump working from a power take off driven by the road engine and designed to carry out a crew of personnel with additional equipment including ladders, a water tank and hose reels
- 4.2 Aerial apparatus including turntable ladders and hydraulic platforms
- 4.3 Emergency rescue tenders designed to carry a comprehensive range of rescue equipment and special appliances for rough terrain
- 4.4 Rapid intervention vehicles used at airfields and within brigades for fire fighting and rescue
- 4.5 Vehicles used to convey water and foam concentrate in bulk to the fireground
- 4.6 Vehicles use at chemical incidents including those used to decontaminate personnel
- 4.7 Vehicles used to assist in fireground control and command
- 4.8 Vehicles used to convey salvage equipment
- 4.9 Vehicles used to lay hose to incidents whilst the vehicle is being driven
- 4.10 Recovery vehicles designed to help recover other vehicles that may have broken down or are unable to move

5. Equipment

5.1 Hose

Describe in detail the performance requirements and the construction of the various types of hose

5.2 Ropes

- a) Discuss in detail the comparison between natural, man made and wire ropes
- b) Describe in detail the construction of such ropes.
- c) Describe a turntable rescue line, a lowering line, a long line and a short line and explain the usage of each
- d) Describe methods of obtaining mechanical advantage when using lines with blocks and tackle
- e) Line rescue capability

5.3 Foam and foam making equipment

- a) Detail the different properties of the various foams and foam concentrates
- b) Classify problems by expansion and by constituents (low medium high)
- c) State the conditions under which foam concentrates should be stored
- d) Name the types of equipment required to produce foam
- e) Specify the care and maintenance of foam making equipment
- f) Describe the application rates of foam and factors to be taken into account when using foam to extinguish a fire
- g) State what is meant by 'pressurised foam supply'

5.4 Ladders

- a) Specify the safety precautions to be observed when handling/pitching/climbing ladders
- b) Detail in depth the principles of working with ladders

5.5 Breathing apparatus and associated equipment

- a) Describe the principal component parts and the passage of air from the cylinder at high pressure to the wearer in a specific type of compressed air apparatus
- b) Describe one type of Breathing Apparatus communications equipment

- c) Describe a safety procedure used to control the use of BA by up to 12 wearers
- d) Describe methods of testing a specific type of apparatus
- e) Describe in detail a typical hand operated resuscitation apparatus and typical automatic resuscitator

5.6 Hydraulic rescue equipment, cutting gear and other rescue apparatus

- a) Describe the construction and operating principles of compressed air power tools, electric power tools and flame cutting equipment
- b) Name the items in a typical hydraulic rescue kit and state the operating instructions and general maintenance applicable to the equipment
- c) Describe the operation of hauling and lifting equipment
- d) Operational use of all the above

5.7 Lighting equipment

Explain in detail the term 'Intrinsically Safe'

5.8 Chemical protective clothing

Describe the principles of clothing design to give total environmental protection by being 'gas tight', or limited protection against splashing by harmful chemicals. Show an understanding of the testing and maintenance procedures to be adopted for such items

5.9 Radiation equipment

Describe in detail the type of equipment used in relation to radiation incidents

6. Water supplies

- a) Provision of supplies of water for firefighting purposes
- b) Operational use of water from its supply for firefighting purposes

7. Risk assessment

- a) Discuss the principles of a risk assessment based approach to planning operational fire cover
- b) Explain the principles of risk assessment at operational incidents

Paper 2c: Aero Fire Studies (Optional). Accredited Unit T/502/3116.

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

- 1.1 Discuss the categorisation of airports in relation to the fire fighting protection to be provided
- 1.2 Detail the provision of principal and complementary extinguishing media and describe their characteristics
- 1.3 Outline the discharge rates for extinguishing agents
- 1.4 Discuss the provisions of rescue and fire-fighting vehicles and detail their response times and specifications
- 1.5 Explain in detail the meaning of the term 'critical area concept'
- 1.6 Discuss the provision of water supplies at airports and airfields

2. Fire protection of airport buildings

- 2.1 Describe the use, construction features and classification of aircraft hangars
- 2.2 Describe the principles of hangar separation
- 2.3 Detail the fire protection measures that should be recommended for different groups of hangars
- 2.4 Explain the basic layout of airport terminal buildings
- 2.5 Discuss the fire protection measures that should be recommended for airport terminal buildings

3. Aircraft construction

- 3.1 Detail the materials normally used in aircraft construction
- 3.2 Outline the features of aircraft construction
- 3.3 Describe the features of power systems and services
- 3.4 Describe the features of internal fixtures and fittings
- 3.5 Discuss in detail the aircraft access and evacuation systems
- 3.6 Classify passenger emergency exits in terms of type, size and location and be able to determine the number and type of exits to be provided for each side of an aircraft according to passenger carrying capacity
- 3.7 Discuss the provision of fixed fire protection systems in aircraft
- 3.8 Describe the various engines used in aircraft and outline their hazards
- 3.9 Discuss the types of aviation fuels that are used and outline their characteristics
- 3.10 Describe the construction details of rotary wing aircraft
- 3.11 Categorise the different types of helicopter
- 3.12 Discuss access and escape routes provided in rotary wing aircraft
- 3.13 Describe the position of engines and the general features of rotor blades
- 3.14 Describe the provision of fuel tanks in military aircraft
- 3.15 Discuss the types of fuel used in military aircraft
- 3.16 Describe the access to and exits from military aircraft including cockpit canopies, break-in points and emergency hatches
- 3.17 Outline the types of power systems and services that may be found in military systems
- 3.18 Outline the three types of storage of armaments and pyrotechnics found on board military aircraft

4. Emergency planning and procedures

- 4.1 Explain the use of maps, rendezvous points, standby points and the involvement of interested organisations in pre-planning
- 4.2 Detail the categorisation of emergencies at airports and define these terms:-
 - a) Aircraft accident
 - b) Full emergency
 - c) Local standby
 - d) Bomb alert/bomb suspected
 - e) Domestic fire
- 4.3 Discuss the pre-determined attendance and the role of the local authority fire services
- 4.4 Discuss the following features that are useful for planning procedures:-
 - a) Observation and watching duties
 - b) Determining the best position for standby for emergency vehicles

5. Aircraft fire-fighting procedures and techniques

- 5.1 Discuss in detail the types and causes of aircraft ground incidents and fires that can be encountered and the methods of dealing with them including:-
- a) Fuselage and passenger cabin fires
 - b) Wheel fires and hot brakes
 - c) Engine fires
 - d) Running fuel fires
 - e) Metal fires
- 5.2 Discuss the methods of dealing with aircraft fuel spillage with and without a fire occurring
- 5.3 Discuss the fire tactics and techniques that need to be adopted for attending incidents at airports for the following:-
- a) Approaching the incident
 - b) Appliance positioning
 - c) Application of extinguishing agents
 - d) Use of additional water supplies and extinguishing agents
 - e) Locating the incident
 - f) Casualty handling
- 5.4 Define the meaning of “high speed accident” and “low speed accident”, and describe in general terms the actions of the fire and rescue service at these types of incidents
- 5.5 Detail the procedure for foaming runways for emergency landings
- 5.6 Describe the methods used to foam runways
- 5.7 Discuss the advantages of foaming runways and outline the problems associated with this procedure

6. Rescue from aircraft

- 6.1 Describe the methods used to evacuate an aircraft by the flight crew
- 6.2 Describe the methods used to evacuate an aircraft by the fire service and rescue personnel
- 6.3 Detail the methods of entry that can be used to gain access to an aircraft
- 6.4 Discuss the principles of rescue procedures for rescue from civil aircraft
- 6.5 Detail the methods of entry used to gain access to military aircraft including access via cockpit canopies
- 6.6 Outline the dangers presented by ejection seats and the principles of making them safe
- 6.7 Describe the methods of release and rescue of aircrew

7. Post accident procedures

- 7.1 Discuss the movement of wreckage and the practice of de-fuelling
- 7.2 Discuss the need to decontaminate personnel and equipment
- 7.3 Describe methods of dealing with ignition sources and the evacuation of the surrounding area
- 7.4 Discuss the removal and collation of personal belongings
- 7.5 Discuss the removal and moving of bodies including the recording of position and locations

8. Heliports

- 8.1 Discuss the main factors that need to be considered in choosing a heliport site

- 8.2 Outline the points that need to be considered when determining the size of a heliport including the final approach and take-off areas
- 8.3 Discuss the levels of fire protection required for heliports
- 8.4 Outline the categorisation of heliports in relation to the provisions of fire protection facilities to be provided
- 8.5 Discuss the response times for fire and rescue personnel at both surface and elevated heliports

Paper 3: Fire Engineering Science (Mandatory). Accredited Unit D/502/3112.

1. Analysis and interpretation of data

- 1.1 Extract and tabulate given data and express that data in the form of:-
 - a) Graphs
 - b) Histograms and bar charts
 - c) Circular diagrams (pie charts)
- 1.2 Obtain median, mean and norm values from given data
- 1.3 Extend graphs to:-
 - a) Project values from given data (extrapolate)
 - b) Deduce values from missing data (interpolate)

2. Mechanics

- 2.1 Define the SI system of units in terms of basic and derived units
- 2.2 Describe and carry out simple calculations involving the equations of motion
- 2.3 Describe Newton's Laws of Motion
- 2.4 Use vector quantities to find resultant values
- 2.5 Apply vector methods to force and motion problems
- 2.6 Calculate moments around a fulcrum including the use of levers and parallel force
- 2.7 Carry out calculations involving centres of gravity and buoyancy
- 2.8 Define stress strain, describe Hooke's Law and carry out calculations involving these terms
- 2.9 Apply the calculations of work, power, density and efficiency to practical examples
- 2.10 Describe and calculate the friction force between two surfaces in contact

3. Hydraulics

- 3.1 Define the following terms and demonstrate the relationship between them:-
 - a) Density
 - b) Specific gravity
 - c) Pressure in fluids
- 3.2 Solve problems involving the terms referred to in 3.1
- 3.3 Define "streamline flow"
- 3.4 Show how the principle of atmospheric pressure is used in pumping systems either as an aid to flow or as a means of measuring flow
- 3.5 Use the laws of friction to calculate energy losses in piped water supplies

- 3.6 In relation to pumps, define water power, brake power and efficiency. Carry out basic calculations involving these terms
- 3.7 Explain the relationship between velocity and discharge of water through hose of differing diameters
- 3.8 Discuss the purpose and design of branches and nozzles
- 3.9 Calculate the theoretical and the effective height of a jet

4. Electricity

- 4.1 Describe electric current as a flow of electrons
- 4.2 Describe how electrical energy is generated and distributed
- 4.3 Explain the characteristics of alternating and direct current
- 4.4 Describe the operation and characteristics of a step-up and step-down transformer
- 4.5 Explain Ohm's Law and calculate the relationship between resistance, amperage and voltage in simple circuits (parallel and series).
- 4.6 Use Ohm's Law to solve problems
- 4.7 Explain the magnetic and chemical effects of electrical currents and show how these phenomena are applied in:-
 - a) Electric motors
 - b) Primary and secondary electric cells
- 4.8 Describe the function and method of operation of fuses and circuit breakers
- 4.9 Define and solve problems involving resistance variation with temperature and resistivity
- 4.10 Apply the concept of power to electrical circuits

5. Heat

- 5.1 Define and calculate:-
 - a) Specific heat capacity
 - b) Latent heat of vaporisation
- 5.2 Apply the use of 5.1 to calculations involving the transfer of heat
- 5.3 Calculate linear, superficial and volumetric expansion using the relevant coefficients
- 5.4 Apply the Gas Laws to calculations involving changing conditions of heat

6. Radioactivity

- 6.1 Describe the principle of radioactivity
- 6.2 Explain the construction of alpha and beta particles and gamma radiation and compare their penetrating powers
- 6.3 Define the terms decay and half life
- 6.4 Describe the biological effects of radiation and precautions to be adopted for safety from the effects of radiation

7. Chemistry

- 7.1 Describe the construction of an atom and show how the electron shell configuration has an effect on reactivity
- 7.2 Explain the concept of valency and the relevance of the periodic classification of the elements
- 7.3 Apply the concept of valency to the formation of chemical compounds
- 7.4 Balance simple chemical equations and define stoichiometric conditions
- 7.5 Calculate relative molecular masses and vapour densities from given relative atomic masses
- 7.6 Use “balanced” chemical reactions for the calculation of the masses and the volumes, of reactants in chemical reactions
- 7.7 Demonstrate an understanding of the classifications of the chemical elements and the main hazards associated with each grouping
- 7.8 Demonstrate knowledge of the properties, reactions and hazards associated with elements defined as:-
- a) Metals
 - b) Non-metals
- 7.9 Describe the main properties of the following compounds and elements:-
- a) Acids (inorganic and organic)
 - i. Ammonia
 - ii. Calcium oxide
 - b) Alkalis
 - i. Ammonium hydroxide
 - ii. Carbon monoxide
 - iii. Carbon dioxide
 - iv. Chlorine
 - v. Hydrogen
 - vi. Oxygen
 - vii. Sodium
 - viii. Sulphur
 - ix. Phosgene
- 7.10 Define hydrocarbons
- 7.11 Describe the structure and main properties of the first four members of the alkane family
- 7.12 Define the terms flashpoint, fire point and spontaneous ignition temperatures
- 7.13 Describe the principles involved in the extinction of fire by smothering, cooling and oxygen starvation
- 7.14 Outline the principle of the fire “tetrahedron” and inhibition of combustion chains involving a “free radical” mechanism

8. Principles of heat and combustion sensitive detection devices

- 8.1 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
- 8.2 Demonstrate knowledge of the use and effectiveness of the detectors listed above in 8.1 according to the risk to be covered and their reliability

8.3 Demonstrate the operating principles of thermocouples and thermistors

9. General

Describe and outline the principles of fire science and technical knowledge in relation to fire service operations and fire fighting.

**Paper 4: Human Resource Management in Fire and Rescue Services - International (Optional).
Accredited Unit A/502/3117.**

1. Planning, control and review

- 1.1 Identify the responsibilities of a team leader in connection with the needs of customers and suppliers both internal and external to the organisation
- 1.2 Discuss the responsibilities of employee and employer in relation to health and safety at work
- 1.3 Describe planning methods for achieving productive results
- 1.4 Discuss leadership of individuals and team members and understand the different styles of command

2. Introduction to quality management

- 2.1 Outline the basic processes for the maintenance of quality assurance and control
- 2.2 Identify the team leader's role in meeting organisations objectives and implementing policy
- 2.3 Understand the need for effective recording systems, staff reporting and simple budgetary control
- 2.4 Detail employee training and development systems

3. Use and control of resources

- 3.1 Describe the role of the team leader when using resources efficiently
- 3.2 Outline the concept of effective resource management
- 3.3 Describe the process of motivation
- 3.4 Discuss typical problems associated with delegation
- 3.5 Identify the human relationship between environment, personality and behaviour
- 3.6 Examine communication systems in resource control

4. Management and Self Development

- 4.1 Identify the need to manage personal and professional development and to build effective working relationships
- 4.2 Assess the effect of personal performance and style of working, taking into account the views of other relevant people
- 4.3 Draw up a specific, measurable and achievable action plan for self-development, which takes into account known priorities and personal resources

- 4.4 Examine individual jobs and set out a plan for effective time management
- 4.5 State the principles of good communication
- 4.6 Describe methods of maintaining confidentiality
- 4.7 Examine personal relationships with line managers, colleagues and team members
- 4.8 Describe a system for informing people of expected standards of work and behaviour
- 4.9 Describe formal and informal systems for handling conflict in organisation

5. Recruitment

- 5.1 Discuss the process of recruitment of people within the role of the team leader
- 5.2 Describe the legal requirements for recruiting and employing personnel
- 5.3 Describe a typical organisation system for identifying personnel requirements
- 5.4 Prepare a job description and personnel specification from given information
- 5.5 State the principles to be followed when recording information on all candidates involved in the selection process

6. Individual and team development

- 6.1 Describe how to make a significant contribution to development of teams and individuals, to ensure the best use of Human Resources in achieving team and organisational objectives
- 6.2 Identify different development needs
- 6.3 Outline how to influence people's response to identified needs
- 6.4 Discuss how to contribute to the planning of developmental activities
- 6.5 Explain how to monitor, review and provide feedback on individuals' development activities
- 6.6 Explain the ways on which work can be carried assessed. List the information that is needed to carry out the assessment
- 6.7 Outline how to produce a realistic and achievable work plan and communicate it to a team
- 6.8 Explain how to involve staff in the assessment process

7. Improving team performance

- 7.1 Identify typical problems likely to lead to poor work performance
- 7.2 Describe the range of support services available to a team member with a problem, which is affecting work performance
- 7.3 Outline the need for respect for a team member with whom poor work performance is being discussed
- 7.4 Detail the main steps which a disciplinary procedure should incorporate
- 7.5 Explain how to maintain confidentiality when dealing with a grievance

8. Information collection and analysis

- 8.1 Describe the need for a good sound knowledge of managing information efficiently within the role of a team leader
- 8.2 Discuss information collection and use to organisational effectiveness

- 8.3 Explain how to carry out an investigation requiring the collection and validation of information and takes account of resource availability
- 8.4 Explain the principles of confidentiality
- 8.5 Explain how feedback is used to check understanding
- 8.6 Evaluate the use of a meeting
- 8.7 Plan a meeting for a small group of people including:-
 - a) Its purpose and objective
 - b) Preparation required
 - c) Length and timing
 - d) Post meeting requirements

Paper 5: Fire Service Operations – UK Specific (Optional). Accredited Unit K/502/3114.

1. Firefighting Techniques

1.1 Incident Command.

- a) Discuss the purpose of pre-planning for any specified emergency
- b) Explain the value of specific command references for officers, including Sector Command procedures
- c) Explain systems of incident command
- d) Detail all types of fireground communications systems, especially a typical incident communication network incorporating feedback techniques.
- e) Describe principles for general control, fireground tactics and fireground strategy
- f) Explain the need for evacuation at fires
- g) Outline the strategy and tactics involved in rescue work
- h) Explain the objectives of ventilation at fires
- i) Describe the aims and principles of salvage/damage control

1.2 Fire Development and Extinguishment, including:-

- a) Methods of identifying different types of burning materials
- b) Various ways in which fire can spread within buildings and between buildings
- c) Explain in detail the principles, application and benefits of ventilation, including Positive Pressure Ventilation

1.3 Fireground Safety.

Discuss, particularly in relation to generic risk assessments, the hazards, risks and operational procedures for the following:

- a) Responding to emergency
 - i. Turning out
 - ii. Proceeding to incident
 - iii. Arriving/getting to work
- b) Rescues from
 - i. Ice/unstable ground
 - ii. Lifts/escalators
 - iii. Sewers
 - iv. Silos

- v. Trench/pits
 - vi. Collapsed structures
 - xii. Height
 - xiii. Water including flooding
 - ix. Large animal rescue
 - x. Machinery (trapped persons)
 - xi. Tunnels
 - xiii. Ships
- c) Fighting Fires
- i. Buildings
 - ii. High rise
 - iii. Chimneys
 - iv. Rural areas
 - v. Farms
 - vi. Using PPV
 - vii. In refuse
 - viii. Public entertainment venues
 - ix. Places of lawful detention
 - x. Petrochemical and pipelines
- d) Transport Systems
- i. Road
 - ii. Rail
 - iii. Air
 - iv. Marine
 - v. Helicopters
- e) Generic Hazards
- i. Electricity
 - ii. Common industrial gases, including acetylene
 - iii. Chemical
 - iv. Biological
 - v. Confined spaces
 - vi. Civil or local disturbances
 - vii. Explosives
 - viii. Flashover/backdraught
 - xiv. Asbestos
 - xv. Industrial processes
 - xvi. Radiological hazards

2. National Resilience

2.1 Terrorist Incidents

- a) Incidents resulting from high level terrorist acts of national significance, (including chemical, biological, radiological and nuclear hazards - CBRN).
- b) Incidents arising from low level threats posed by groups such as animal rights organisations.

2.2 Heavy Rescue Equipment including search and rescue in built up areas.

- a) Describe the construction and operating principles of compressed air power tools, electric power tools and flame cutting equipment
- b) Name the items in a typical hydraulic rescue kit and state the operating instructions and general maintenance applicable to the equipment
- c) Describe the operation of hauling and lifting equipment, including blocks and tackle, and the associated anchoring methods
- d) The operational use of the above

2.3 **Legislation**

2.3.1 **General**

- a) Powers of entry and responsibilities under the relevant legislation.
- b) Operational responsibilities for fire services under the relevant legislation.

2.3.2 **Knowledge and understanding of the principles of a risk assessment based approach to planning operational fire cover, with reference to the relevant national legislation.**

- a) Integrated Risk Management Planning.
- a) Key agencies and their respective roles.

3. **Equipment and its operational use**

3.1 **Working at Height**

- a) Line rescue capability including operational procedures
- b) Safe systems of work

3.2 **Foam and Foam Making Equipment**

- a) Detail the different properties of the various foams and foam concentrates
- b) Classify problems by expansion and by constituents (low, medium and high)
- c) State the conditions under which foam concentrates should be stored
- d) Name the types of equipment required to produce foam
- e) Specify the care and maintenance of foam making equipment
- f) Describe the application rates of foam and factors to be taken into account when using foam to extinguish a fire
- g) State what is meant by 'pressurised foam supply'

3.3 **Breathing Apparatus and Associated Equipment**

Responsibilities for its operational use under the relevant technical bulletins.

3.4 **Chemical Protective Clothing**

Knowledge of clothing design to give total environmental protection by being 'gas tight', or limited protection against splashing by harmful chemicals. Understanding of the testing and maintenance procedures to be followed in the case of these items.

3.5 **Radiation Equipment**

Describe in detail the types of equipment used in relation to radiation incidents

3.6 **Water Supplies**

- a) Provision of supplies of water for firefighting purposes.
- b) Operational use of water from its supply for firefighting purposes.

4. **Post Incident Considerations**

4.1 **Debriefs**

4.2 **Media liaison**

- 4.3 Basic fire investigation principles
- 4.4 Informing relevant stakeholders and agencies.

Paper 6: Leadership and Management in Fire and Rescue Services – UK Specific (Optional). Accredited Unit M/502/3115.

This Management and Leadership syllabus has been specially developed to meet the needs of Fire and Rescue Services who wish to assess the underpinning knowledge of staff at Watch Manager Level.

As it is a bespoke syllabus for the fire and rescue services, candidates need to ensure they are aware of the following documents or processes:-

1. The Fire and Rescue Service Core Values.
2. The Fire and Rescue Service National Strategy 2008-11.
3. The Fire and Rescue Service Equality and Diversity Strategy 2008-18
4. The Audit Commission Assessment process.

In addition to the initiatives listed above, the syllabus attempts to encompass the existing and draft occupational standards, the relevant components of the Aspire Leadership Model, and the National Framework.

This examination syllabus recognises the importance of ‘first line’ managers (identified by the CIPD as being the vital lynch pin in organisations,) and analyses their role under the following four themed headings:-

- 1 **Managing in an Organisational Context.**
- 2 **The Learning Organisation.**
- 3 **Managing and Leading People.**
- 4 **Managing to Achieve Outcomes.**

The National Occupational Standards are linked to the above themes.

1 Managing in an Organisational Context

All organisations operate within a particular context and this applies to fire and rescue services. It is important for first line managers to think about the effect that legislation and other types of procedures will have upon their day to day work. The National Framework 2008-2011, together with the Scottish and Welsh equivalents will be a major influence on the work of the fire and rescue services.

1.1 Meeting Health and Safety Requirements

The underlying aim of health and safety is to promote actively the well being of employees and those affected by the operation of a fire and rescue service. When staff perceive that their well being is respected and promoted, this is likely to improve morale and faith in the organisation.

- a) Explain why health and safety in the workplace is important
- b) Identify your personal responsibilities and liabilities under health and safety legislation.

- c) Describe how you would keep up with legislative and other developments relating to health and safety.
- d) Explain the requirement for an organisation to have a written health and safety policy
- e) Describe how to communicate the written health and safety policy statement to people who work in your area of responsibility and other relevant parties.
- f) Describe how and when to review the application of the written health and safety development.
- g) Identify how and when to consult with your team or their representative on health and safety issues
- h) Identify the sources of specialist expertise in relation to health and safety.
- i) Describe ways of developing a culture of health and safety in your team.
- j) Identify the type of hazards and risks that may arise in relation to health and safety; how to establish and use systems for identifying hazards and assessing risks and the actions that should be taken to control or eliminate them.
- k) Describe how to establish systems for monitoring, measuring and reporting on health and safety performance.
- l) Explain why and how health and safety should inform planning and decision-making.
- m) Identify the importance of setting a good example to others in relation to health and safety.
- n) Identify the type of resources required to deal with health and safety issues

1.2 Investigating and Reporting on Fire and Rescue Events to Improve Practices and Procedures.

Fire and rescue services, like all types of organisation, operate within a particular environment and have procedures and systems to meet the challenges in the environment which surrounds them. These are often volatile, leading to the need to keep the organisation's systems up to date.

Health and Safety

- a) Explain how to identify hazards and risks in the workplace affecting people and the environment.
- b) Describe how to apply practices that maximise the health, safety and welfare of yourself and others in the workplace.
- c) Explain how to make and apply decisions based on the assessment of risk.

Organisation

- a) Identify legislation that applies to the fire and rescue services
- b) Explain how to access, interpret and provide relevant information, including feedback.
- c) Describe record systems and their use.
- d) Identify the sources and availability of information.
- e) Describe different types of investigation required within the organisation.

Personal and Interpersonal

- a) Explain how to communicate clearly and effectively with the range of people involved.
- b) Describe how to treat colleagues and members of the public with respect and consideration, taking account of and accepting diversity, as well as the fire and rescue service core values.
- c) Explain the importance of lines and methods of communication/reporting in the workplace.
- d) Explain the importance of knowing the roles, responsibilities and limits to the authority of yourself, your colleagues and other agencies in the workplace.

Technical

- a) Explain how to conduct an investigation.
- b) Describe how to gather and present evidence.
- c) Describe how to identify and preserve evidence.
- d) Describe how to support the investigation of an event.
- e) Describe different types of evidence and their importance.

- f) Describe the methods and principles of report writing.

2 The Learning Organisation

Many writers have identified the importance of the learning nature of organisations, in which the development of the talents and skills of staff is regarded as “the way we do things around here”. In a Learning Organisation the role of the ‘first line manager’ is to help develop the careers of others so that the organisation has a skill base to enable it to meet existing and future challenges. The Fire and Rescue Service Core Values, National Framework and the Equality and Diversity Strategy, together with the Scottish and Welsh equivalents, are evidence of the way in which fire and rescue services seek to be learning organisations.

2.1 Providing Learning Opportunities for Colleagues.

First line managers have an important role in developing a ‘learning culture’ within their team. This involves identifying and using various means of providing development opportunities and encouraging staff to identify their particular needs.

- a) Describe the benefits of learning for individuals and organisations and how to promote these benefits to colleagues
- b) Detail ways in which you can develop an environment in which learning is valued and willing and determined efforts to learn are recognised.
- c) Explain why it is important to encourage colleagues to take responsibility for their own learning.
- d) Explain how to provide fair, regular and useful feedback to colleagues on their work performance.
- e) Explain how to identify learning needs based on recognised gaps between the requirements of colleagues’ work-roles and their current knowledge, understanding and skills.
- f) Describe how to prioritise the learning needs of colleagues, taking into account the priorities and requirements of the organisation and the personal and career development needs of colleagues.
- g) Outline the range of different learning styles and explain how to support colleagues in identifying the particular learning styles that work best for them.
- h) Discuss the different types of learning activities, their advantages and disadvantages and the resources they require, e.g. time, fees, substitute staff etc.
- i) Explain how to identify and obtain information on different learning activities
- j) Explain how to set **SMART** learning objectives.
- k) Describe why it is important for colleagues to have a written development plan, and what it should contain.
- l) Explain what type of support colleagues might need to undertake learning activities, the resources needed and the types of obstacles they may face. How can these difficulties be overcome?
- m) Describe how to evaluate whether or not a learning activity has achieved the desired learning objectives.
- n) Discuss the importance of regularly reviewing and updating written development plans in the light of performance, the learning activities undertaken and any wider changes.
- o) Explain how you would provide learning opportunities for colleagues while taking into account equality legislation, relevant codes of practice and general diversity issues.

2.2 Communicating Information and Knowledge.

Part of the staff development involves the provision of relevant information to enable them to do their job. The ‘first line manager’ has an important role in ensuring that the necessary details are provided and understood.

- a) Identify how you would assess the information needs of your team members, colleagues and line manager.
- b) Discuss the importance of communicating information and knowledge only to those who have a right to it.

- c) Identifying people's preferred means of communication; languages, styles, timing and pace
- d) Explain the importance of checking the currency, accuracy and completeness of the information and knowledge you are communicating, and how you would achieve this.
- e) Explain the importance of structuring your communication in ways that facilitate people's reception and understanding, and how you would do so.
- f) Discuss the techniques which can be used to gain and maintain people's attention and interest. Describe how to help them retain information and knowledge and explain how to use a variety of techniques to accomplish this.
- g) Explain the importance of using verbal and non-verbal feedback to help you fine-tune your communication, and how to do so.
- h) Explain why it is important to identify and communicate the level of confidence that can be placed on the information and knowledge; i.e. whether it is based on rigorously researched evidence, widely accepted facts or personal opinion.
- i) Explain the importance of carefully explaining jargon, technical terms, acronyms and abbreviations
- j) Discuss the importance of confirming that people have received and understood the information and knowledge you have communicated, and explain how you would do so.

3 Managing and Leading People.

The purpose of Managing and Leading People is to encourage 'first line managers' to consider, evaluate, analyse and apply approaches to people, leadership and management that:-

- a) To minimise and/or eliminate the barriers that can affect the performance of staff.**
- b) To encourage employees to maximise their contribution to their own development and to the achievement of corporate goals.**
- c) It also places emphasis on the need to set a good example through a positive approach to personal development and recognises the importance of developing good working relationships with colleagues.**

The Fire and Rescue Service Core Values, the Equality and Diversity Strategy and their Scottish and Welsh equivalents set out important principles related to the management and leadership of staff.

3.1 Effective Leadership

Effective leadership is concerned with gaining the commitment of staff to ensure the achievement of the organisation's objectives and the acceptance of change.

- a) Explain the differences between management and leadership
- b) Describe how to create a compelling vision.
- c) Explain how to select and apply successfully different methods of communicating with people.
- d) Describe a range of different leadership styles. Explain how to select and apply these to different situations and people.
- e) Explain how to obtain and make use of feedback on your leadership performance.
- f) Discuss the types of difficulties and challenges that may arise, (including conflict within the area) and ways of identifying and overcoming them.
- g) Explain the benefits of creating and maintaining a culture which encourages and recognises creativity and innovation
- h) Explain the importance of encouraging others to take the lead and describe ways in which this can be achieved.
- i) Describe how to select and successfully apply different methods for encouraging, motivating and supporting people and recognising achievement.

3.2 Addressing Problems Related to Team and Individual Performances

Many writers have highlighted the negative effects of 'blame cultures', in which staff are afraid to admit to mistakes. Operating within a positive environment from which the fear of blame is absent improves the operation of the organisation and the working relationship between 'first line managers' and team members.

- a) Explain the importance of giving team members opportunities to approach you with problems affecting their performance
- b) Describe how to encourage team members to approach you with problems affecting their performance.
- c) Explain the importance of identifying performance issues and bringing these promptly to the attention of the team members concerned.
- d) Explain the importance of discussing problems with team members at a time and place appropriate to the type, seriousness and complexity of the problem.
- e) Outline how to gather and check the information you need to identify the problem and its cause.
- f) Describe the importance of identifying the problem accurately.
- g) Describe the range of alternative courses of action to deal with the problem.
- h) Discuss the importance of discussing and agreeing with the team member a timely and effective way of dealing with the problem.
- i) Identify occasions when you would refer a team member to support services or specialists.
- j) Explain the importance of keeping a confidential record of your discussions with team members about problems affecting their performance, and how to do so.
- k) Explain the importance of ensuring that your actions are in line with your organisation's policies for managing people and their performance.

3.3 Managing Your Own Personal Development.

Being a professional brings with it the responsibility to ensure that skill and knowledge levels are maintained. The investment of time and learning in achieving this should be seen as an essential part of professional life and not as an optional extra.

- a) Detail the principles which underpin professional development.
- b) Explain the importance of considering your values and career and personal goals and how you would relate them to you job and professional development
- c) Describe how to evaluate the current requirements of a work role and how the requirements may evolve in the future.
- d) Describe how to set **SMART** objectives. (**S**pecific; **M**easurable; **A**chievable etc.)
- e) Outline how to identify development needs to address any perceived gaps between the requirements of your work role and your current knowledge, understanding and skills.
- f) Explain what an effective development plan should contain and the timescale that it should cover
- g) Describe the range of different learning styles and how to identify those that work best for you.
- h) Describe the type of developmental activities which can be undertaken to address identified gaps in your knowledge understanding and skills
- i) Explain how you would identify whether and how development activities have contributed to your performance.
- j) Describe how to update work objectives and development plans in the light of performance and feedback received. Outline any development activities undertaken and any wider changes involved.
- k) Describe how to monitor the quality of your work and your progress against requirements and plans
- l) Describe how to evaluate your performance against the requirements of your work role.
- m) Describe how to identify good sources of feedback on your performance.

3.4 Developing Productive Relationships with Colleagues.

All parts of an organisation are inter-linked and therefore the success of a fire and rescue service depends upon all parts working harmoniously together. In some instances colleagues can be regarded as customers and in others as suppliers. In all cases the core values set out the importance of treating everyone with respect.

- a) Explain the benefits of developing productive working relationships with colleagues.
- b) Outline the principles of effective communication and explain how to apply them in order to communicate effectively with colleagues.

- c) Explain how to identify disagreements with colleagues and describe the techniques for resolving them.
- d) Explain how to identify conflicts of interest with colleagues and describe the measures that can be used to manage or remove them.
- e) Explain how to take account of diversity issues when developing working relationships with colleagues.
- f) Identify why it is important to exchange information and resources with colleagues.
- g) Identify how to get and make use of feedback from colleagues on your own performance.
- h) Identify how to provide colleagues with useful feedback on their performance.

4 **Managing to Achieve Outcomes.**

Nothing stands still in today's fire and rescue services. 'First line managers' must ensure standards are met, and that work plans are kept on target, completed and maintained; while constantly striving to do better. This will include agreeing objectives, establishing mutual expectations with other managers, colleagues, team members, customers and understanding systems, structures and processes that are relevant to the role. Many of the targets being used will stem from external assessment reports such as CPA, the National Framework 2008-11, together with the Equality and Diversity Strategy and the Scottish and Welsh equivalents.

4.1 **Developing and Implementing Operational Plans**

Ensuring that a fire and rescue service operates effectively involves developing plans to achieve goals and targets. It also includes identifying risks which could affect the fulfilment of plans.

- a) Explain the principles and methods of short-to-medium term planning
- b) Describe the importance of creativity and innovation in operational planning
- c) Identify how to develop and assign objectives which are **SMART (Specific, Measurable, Achievable, Realistic and Time Bound)**
- d) Describe how to analyse and manage risk
- e) Discuss how to develop and plan for contingencies.
- f) Explain the principles and methods of delegation
- g) Explain how to use resources effectively to achieve objectives
- h) Identify how to consult with colleagues and other key stakeholders
- i) Identify how to monitor and control operational plans to achieve their objectives
- j) Describe how to develop and use an evaluation framework.

4.2 **Allocating Work and Monitoring Progress and Quality**

Practically all activities with any organisation involve making progress through the achievement of staff. People need to be aware of their responsibilities and provided with relevant information and resources. They should be given the opportunity to suggest improvements and they are entitled to a harmonious workplace in which to operate.

- a) Explain how to select and successfully apply different methods of communicating with people.
- b) Describe the importance of confirming and clarifying work matters with your manager and explain how to do this effectively.
- c) Identify how to take due account of health and safety issues in the planning, allocation and monitoring of work.
- d) Explain how to produce a plan of work, describing how to identify any priorities or critical activities as well as making resources available.
- e) Explain the importance of seeking the opinion of your team members and identify how to take account of their views when producing a plan of work.
- f) Explain why it is important to allocate work to individuals and/or teams on a fair basis and describe how to do so effectively.
- g) Explain why it is important that individuals and/or teams are briefed on allocated work and the standard and level of expected performance. Describe how to do so effectively.

- h) Explain the importance of showing individuals and/or teams how their work fits in with the vision and objectives of the area and those of the organisation.
- i) Describe ways of encouraging individuals and teams to ask questions and to seek clarification in relation to the work which they have been allocated.
- j) Discuss effective ways of regularly and fairly monitoring the progress and quality of the work of individuals and teams against the standards of expected performance.
- k) Identify ways of providing prompt and constructive feedback to individuals and teams.
- l) Explain why it is important to monitor your area for conflict, identify the cause(s) of conflict when it occurs and deal with it promptly.
- m) Explain why it is important to identify unacceptable or poor performance by individuals and teams and describe how to discuss the cause(s) with them and agree ways of improving performance
- n) Give examples of the problems and unforeseen events that may occur and explain how to support individuals and teams in dealing with them
- o) Describe the additional support and resources which individuals and teams might require to help them complete their work. How would you assist in providing this?
- p) Explain how to select and successfully apply different methods for encouraging, motivating and supporting individuals and teams to complete the work they have been allocated. How would you help them improve their performance and recognise their results?
- q) Describe how to log information about the ongoing performance of individuals and teams. Explain how to use this information for the purposes of formal performance appraisal.
- r) Discuss the importance of reviewing and updating plans of work in the light of developments, reallocating work and resources and clearly communicating the changes to those affected.