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Guide to the NEBOSH National Diploma in Occupational Health and Safety



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Guide to the NEBOSH National Diploma in Occupational Health and Safety (February 2010 specification)

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1. Introduction

The NEBOSH National Diploma is the flagship NEBOSH qualification and is the first UK vocational qualification to be developed specifically for health and safety professionals. Since its introduction in 1988, the National Diploma has become established as the most popular professional qualification for safety and health practitioners in the UK, with over 10,000 candidates having achieved the qualification.

The NEBOSH National Diploma is the qualification for aspiring health and safety professionals, building directly upon the foundation of knowledge provided by the NEBOSH National General Certificate. It is designed to provide students with the expertise required to undertake a career as a safety and health practitioner and also provides a sound basis for progression to postgraduate study.

1.1 Benefits for employers

Accidents and work-related ill-health affect all types of workplaces and occupations. In the year 2004/05, there were 220 people killed at work and a further 120 members of the public fatally injured by work-related activities. Over 1 million injuries and 2.3 million cases of illness are experienced by workers each year with around 25,000 individuals being forced to give up work because of occupational injury or ill-health. An estimated 35 million working days are lost each year as a result of workplace accidents and ill-health.

In addition to the direct costs of sick pay and absence, employers can find themselves dealing with criminal prosecution, claims for compensation, adverse publicity and harm to both business reputation and profitability. In 2009, the CBI estimated the annual cost of occupational injury and illness to the UK economy at £17 billion.

The vast majority of occupational injuries, incidents and ill-health are avoidable by good health and safety management. By saving money, improving productivity and raising workforce morale, effective health and safety management should be recognised as an essential element of a successful management strategy.

Management of health and safety in the workplace is not only a legal obligation and a moral imperative; it also makes good business sense. Qualified health and safety professionals are an asset to their organisations, reducing costs by preventing accidents and ill health of employees, without incurring unnecessary expense by over-reacting to trivial risks.

Courses leading to the NEBOSH National Diploma may be taken in a variety of formats and at a pace to fit around the needs of the business. Its unitised structure recognises success as the student progresses. Its practical approach promotes the application of the knowledge acquired on the course to problem solving in the student's own workplace.

1.2 Professional membership

The qualification meets the academic requirements to apply for Graduate Membership (Grad IOSH) of Institution of Occupational Safety and Health (IOSH). This is the first step to becoming a Chartered Health and Safety Practitioner as a Chartered Member of IOSH (CMIOSH). It is also accepted by the International Institute of Risk and Safety Management (IIRSM) as meeting the academic requirements for Full membership (MIIRSM).

1.3 Qualification level and UK accreditation

The NEBOSH National Diploma in Occupational Health and Safety is accredited and credit rated by the Scottish Qualifications Authority (SQA - www.sqa.org.uk) for delivery across the UK. It is rated within the Scottish Credit and Qualifications Framework (SCQF - www.scqf.org.uk) at SCQF Level 10 with 48 SCQF credit points.

For users in England, Wales and Northern Ireland, this is comparable to a Vocationally-Related Qualification (VRQ) at Level 6 within the National Qualifications Framework (NQF) and Qualifications and Credit Framework (QCF), or Honours Degree standard.

For further information please refer to the “Qualifications can cross boundaries” comparison chart issued by the UK regulators, available from the SQA website (www.sqa.org.uk).

1.4 Key topics covered

- Managing health and safety
- Hazardous agents in the workplace
- Workplace and work equipment safety
- Practical application of health and safety theory

1.5 Course tuition and private study time requirements

Preparatory content:

Unit A: 91 hours tuition and 75 hours private study	Total: 166 hours
Unit B: 71 hours tuition and 50 hours private study	Total: 121 hours
Unit C: 75 hours tuition and 50 hours private study	Total: 125 hours
Unit D: 6 hours tuition and 50 hours private study	Total: 56 hours

A programme of study therefore needs to be based around a minimum of **243 taught hours** and approximately **225 hours of private study** for an overall total of **468 Hours**.

A full-time block release course would be expected to last for a minimum of six weeks (thirty-five working days) and a part-time day release course would be spread over at least thirty weeks. For candidates studying by open or distance learning, the tuition hours should be added to the recommended private study hours to give the minimum number of hours that this mode of study will require.

Tuition time should normally be allocated proportionate to the tuition time for each element but may require adjustment to reflect the needs of a particular student group.

Quoted hours *do not* include assessment time, ie, sitting written examinations (see 1.6).

1.6 Unit examinations

- **Unit A: Managing health and safety**

Assessed by a three hour written examination marked by external examiners appointed by NEBOSH

- **Unit B: Hazardous agents in the workplace**

Assessed by a three hour written examination marked by external examiners appointed by NEBOSH

- **Unit C: Workplace and work equipment safety**

Assessed by a three hour written examination marked by external examiners appointed by NEBOSH

- **Unit D: Application of health and safety theory and practice**

Assessed by one written assignment marked by external examiners appointed by NEBOSH.

1.7 Entry requirements

The NEBOSH National Diploma syllabus assumes that candidates will have the broad basic knowledge of health and safety that is provided by a level 3 qualification in occupational health and safety, in particular the NEBOSH National General Certificate (NGC).

The achievement of the NGC or direct equivalent prior to undertaking the Diploma course is highly recommended, given the demands of level 6 study, the time commitment required and the complementary nature of the NEBOSH NGC and National Diploma. Further information on the NEBOSH National General Certificate can be found via our website www.nebosh.org.uk

However, it should be noted that currently the assessments are offered, and must be answered, in English only. The qualification includes a requirement to write an extended assignment based on the candidate's own workplace, which must also be in English. Candidates should discuss this with the accredited course provider before undertaking the qualification.

Students must satisfy any entry requirements specified by the course provider. Acceptance on to the programme may be based on the admission tutor's judgement on the student's ability to benefit from the programme.

1.8 Minimum standard of English required for candidates

The standard of English required by candidates studying for the NEBOSH National Diploma must be such that they can both understand and articulate the concepts contained in the syllabus. It is important to stress that the onus is on accredited course providers to determine their candidates' standards of proficiency in English.

NEBOSH recommends to accredited course providers that candidates undertaking this qualification should reach a minimum standard of English *equivalent* to an International English Language Testing System score of **7.0** or higher in IELTS tests in order to be accepted onto a National Diploma programme.

For further information please see the latest version of the IELTS Handbook or consult the IELTS website:

http://www.ielts.org/institutions/test_format_and_results.aspx

Candidates wishing to assess their own language expertise may consult the IELTS website for information on taking the test: <http://www.ielts.org/institutions/faqs.aspx>

1.9 Legislation

The syllabus refers to UK legislation. Where the syllabus refers to the legislative system of England and Wales, candidates may refer to the legislative systems and requirements that apply in Scotland or Northern Ireland, provided that these references are clearly indicated as such.

If this qualification is delivered overseas, accredited course providers may refer to examples of local legislation as part of the course programme but examination questions will refer to UK legislation only.

1.10 Legislative updates

Relevant new legislation will become examinable in detail six months after its date of introduction. However, candidates will be expected to be essentially up-to-date at the time of the examination and, whilst a detailed knowledge will not be expected, reference to new or impending legislation, where relevant to an examination question, will be given credit.

Please note, NEBOSH will not ask questions related to legislation that has been repealed, revoked or otherwise superseded.

NB: Accredited course providers are expected to ensure their course notes remain current with regard to new legislation.

1.11 National Occupational Standards (NOS) and best practice

The syllabus is mapped to the relevant National Occupational Standard (NOS):

- NOS for Health and Safety (Practitioner units) published by Proskills Sector Skills Council (www.proskills.co.uk).

The mapping of the syllabus units to each NOS can be found on pages 12-15.

1.12 Qualification type

NEBOSH offers Vocationally-Related Qualifications (VRQs) in England, Wales and Northern Ireland.

VRQs provide the knowledge and practical skills required for particular job roles through a structured study-based training programme that combines the testing of knowledge and understanding in written examinations with practical application of learning in the workplace.

VRQs are a popular type of qualification because they are nationally recognised, flexible and offer routes for progression to employment or further study.

In Scotland, VRQs are known as 'Other accredited qualifications'.

1.13 Qualification progression

National Diploma holders with Environmental responsibilities may wish to take the NEBOSH National Diploma in Environmental Management.

In addition, students who have achieved the NEBOSH National Diploma may be considering further health and safety study. A number of universities offer MSc programs which accept the NEBOSH Diploma as a full or partial entry requirement. Some MSc courses may require additional qualifications/expertise such as a degree, further significant work experience or expect students to complete specific modules e.g. in environmental management.

Further information can be found on our website: www.nebosh.org.uk/qualifications

1.14 Programmes offered by NEBOSH-accredited course providers

Accredited course providers can be located using the 'Where to study' tab on our website: www.nebosh.org.uk

NB: Candidates are advised to check up-to-date information on course dates with accredited course providers directly.

1.15 Examination dates

'Standard' examination dates for this qualification are available in January and July annually. Unit D assignment dates are available in March and September annually.

'Local' or on-demand examinations are *not* available to course providers for this qualification.

1.16 Specification date

The February 2010 specification for this qualification replaces the previous September 2006 specification for all examinations from (and including) 1 July 2011.

1.17 Syllabus development and review

The syllabus has been developed by NEBOSH following extensive consultation with key stakeholders, notably accredited course providers, professional bodies, employers, standards setting organisations, enforcement bodies and subject experts.

NEBOSH would like to take this opportunity to thank all those who participated in the development, piloting and implementation of this qualification.

1.18 Further information for candidates

Further information for candidates including a syllabus summary, qualification overview leaflet and a sample examiner's report can be found via the NEBOSH website (www.nebosh.org.uk). Examiners' reports and past examination papers may be purchased from the NEBOSH online shop.

1.19 Further information for accredited course providers

Further information for accredited course providers including policies and procedures and guidance regarding the Unit D assignment can be found in the accredited course providers' section of the NEBOSH website.

2. Qualification structure

2.1 Unit assessment

The National Diploma in Occupational Health and Safety is divided into four units:

Unit A: Managing health and safety

- Unit A is a taught unit, assessed by one three-hour written examination
- Each written examination consists of eleven questions split into Section A and B
- Section A includes six 'short-answer' questions (10 marks each) – all questions are compulsory
- Section B includes five 'long-answer' questions (20 marks each) – candidates choose and answer three questions only
- Each examination question paper covers the whole unit syllabus with at least one question per unit element
- Candidate scripts are marked by external examiners appointed by NEBOSH
- A sample examination question paper can be found in Section 5.

Unit B: Hazardous agents in the workplace

- Unit B is a taught unit, assessed by one three-hour written examination
- Each written examination consists of eleven questions split into Section A and B
- Section A includes six 'short-answer' questions (10 marks each) – all questions are compulsory
- Section B includes five 'long-answer' questions (20 marks each) – candidates choose and answer three questions only
- Each examination question paper covers the whole unit syllabus with at least one question per unit element
- Candidate scripts are marked by external examiners appointed by NEBOSH
- A sample examination question paper can be found in Section 5.

Unit C: Workplace and work equipment safety

- Unit C is a taught unit, assessed by one three-hour written examination
- Each written examination consists of eleven questions split into Section A and B
- Section A includes six 'short-answer' questions (10 marks each) – all questions are compulsory
- Section B includes five 'long-answer' questions (20 marks each) – candidates choose and answer three questions only
- Each examination question paper covers the whole unit syllabus with at least one question per unit element

- Candidate scripts are marked by external examiners appointed by NEBOSH
- A sample examination question paper can be found in Section 5.

Unit D: Application of health and safety theory and practice

- Unit D consists of a written assignment set by NEBOSH
- Approximately 8,000 words in length
- Submission dates for Diploma assignments are in March and September each year
- Candidate scripts are marked by external examiners appointed by NEBOSH.

NEBOSH follows the “GCSE, GCE, VCE, GNVQ and AEA Code of Practice” published by the regulatory authorities in England, Wales and Northern Ireland in relation to examination setting and marking. Once an externally-assessed examination (written examinations and assignments marked by NEBOSH) has been completed, scripts are sent to NEBOSH and undergo rigorous marking, checking and results determination processes to ensure accuracy and consistency.

2.2 Unit structure

Candidates may choose to take one, two, three or all four units at the same time or at different times.

2.3 Achieving the overall qualification

- The enrolment period for the National Diploma is **five years**
- Students must pass **all four units** within their enrolment period (normally five years), to achieve the qualification
- Candidates who have reached the end of the enrolment period but still wish to complete outstanding units, may apply for a single one year enrolment extension. These are considered by NEBOSH on a case-by-case basis. Successful applications for the enrolment extension will incur a fee.

To qualify for the NEBOSH National Diploma a candidate must:

- Enrol as a course member with an accredited course provider and, through the course provider, with NEBOSH. Enrolment with NEBOSH (with payment of the appropriate fee) should normally be made at the beginning of the programme of study
- Register with NEBOSH through a course provider as a candidate for the relevant examination paper (with payment of the appropriate fee)
- Register with NEBOSH through a course provider as a candidate for the assignment unit (with payment of the appropriate fee)
- Fulfil all other requirements as may be made from time to time by the accredited course provider and/or NEBOSH

2.4 Unit pass standard

The pass standard for each unit may vary according to pre-determined criteria but is normalised to 45% for the written papers (Units A, B and C) and 50% for the assignment unit (Unit D).

2.5 Unit certificates

Candidates who are successful in an individual unit will be issued with a unit certificate, normally within 8 weeks of the issue of the result notification. Units are not graded and the unit certificates will show a 'Pass' only.

2.6 Overall qualification grades

When candidates have been awarded a unit certificate for all four units (ie, have achieved a Pass in units A, B, C and D), the marks are added together and a final grade is awarded as follows:

Pass	185 – 239 marks
Credit	240 – 279 marks
Distinction	280 marks or more

2.7 Overall qualification certificates

Once a candidate has achieved a Pass in all four units and the overall qualification grade awarded they are normally considered to have completed the qualification and an overall qualification parchment will be issued, within three months of the result declaration date for the fourth successfully completed unit.

However, once the result of the fourth successfully completed unit has been issued the candidate has **one month** from the date of issue of that result to either:

- Inform NEBOSH in writing of their intention to re-sit a successful unit for the purposes of improving a grade
- Submit an Enquiry About Result (EAR) request (see Section 3.3).

2.8 Re-sitting examinations

If a candidate's performance in any unit component is lower than a pass, candidates may re-register and re-sit just the component/s in which they have been unsuccessful providing that they re-sit within the 5 year enrolment period. However, each re-sit will incur an additional fee.

Candidates may re-take units at any time within their enrolment period, including where they have passed and wish to re-take to improve their grade. Once all four units have been successfully completed, candidates will need to inform NEBOSH of their intention to re-take **within one month of the date of issue for the fourth unit result**. There is no limit to the number of re-sits within the enrolment period.

If a re-sit results in a lower mark than a previous result for that unit, the highest mark will be retained.

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For the Unit D assignment, there is no limit to the number of submissions within the enrolment period. If a candidate gains lower than the pass mark in the assignment, they may revise and submit the assignment again. However, they must re-register for the assignment in order to do so. Please note that no feedback will be given on the referred assignment and each additional submission will incur a fee. Marks awarded for subsequent submissions will not be capped.

Candidates who register for any unit of the National Diploma whilst awaiting a result from a previous sitting of an examination may not seek a refund of the registration fee if they retrospectively claim exemption for that any successful unit under these circumstances, except in the case of an Enquiry About Result.

3. Policies

3.1 Requests for reasonable adjustments

Reasonable adjustments are arrangements which are approved in advance of an examination to allow attainment to be demonstrated by candidates with either a permanent or long-term disability or learning difficulty, or temporary disability, illness or indisposition.

Requests for reasonable adjustments must be made to NEBOSH by examination accredited course providers at least one month before the examination.

For further details see the NEBOSH *"Policy and procedures on reasonable adjustments and special consideration"* available from the NEBOSH website (www.nebosh.org.uk).

3.2 Requests for special consideration

Special consideration is a procedure that may result in an adjustment to the marks of candidates who have not been able to demonstrate attainment because of temporary illness, injury, indisposition or an unforeseen incident at the time of the assessment.

Candidates who feel disadvantaged due to illness, distraction or any other reason during the assessment must report this to the invigilator (or the accredited course provider in the case of the assignment) before leaving the examination room and request that their written statement, together with the invigilator's comments on the statement, be sent by the accredited course provider to NEBOSH.

Requests for special consideration must be made to NEBOSH by the accredited course provider as soon as possible and no more than seven working days after the assessment.

For further details see the NEBOSH *"Policy and procedures on reasonable adjustments and special consideration"* available from the NEBOSH website (www.nebosh.org.uk).

3.3 Enquiries about results and appeals

NEBOSH applies detailed and thorough procedures to review and check assessment results before they are issued. This includes a particular review of borderline results. It thereby ensures that the declared results are a fair and equitable reflection of the standard of performance by candidates.

There are, however, procedures for candidates or accredited course providers to enquire about results that do not meet their reasonable expectations. An 'enquiry about result' (EAR) must be made in writing within one month of the date of issue of the result to which it relates.

For details see the NEBOSH *"Enquiries and appeals policy and procedures"* document available from the NEBOSH website (www.nebosh.org.uk).

3.4 Malpractice

Malpractice is defined as any deliberate activity, neglect, default or other practice by candidates and/or accredited course providers that compromises the integrity of the assessment process, and/or the validity of certificates. Malpractice may include a range of issues from collusion or use of unauthorised material by candidates, to the failure to maintain appropriate records or systems by accredited course providers, to the deliberate falsification of records in order to claim certificates. Failure by an accredited course provider to deal with identified issues may in itself constitute malpractice.

For further details see the NEBOSH *"Malpractice policy and procedures"* document available from the NEBOSH website (www.nebosh.org.uk).

4. Syllabus - NEBOSH National Diploma in Occupational Health and Safety (February 2010 specification)

Structure

The qualification is divided into four units. Unit A is further divided into ten elements and Units B and C into eleven elements each.

The matrix below indicates how the syllabus elements map to the relevant National Occupational Standards (See also section 1.11):

- National Occupational Standards (NOS) for Health and Safety (Practitioner units) published by Proskills Sector Skills Council (www.proskills.co.uk).

Unit A: Managing health and safety

Element Number	Element Title	Recommended hours	Relevant Proskills units and elements	Page
1	Principles of health and safety management	5	<i>HSP 1, 3, 5, 11</i>	16
2	Loss causation and incident investigation	5	<i>HSP 4, 10</i>	19
3	Measuring and reviewing health and safety performance	6	<i>HSP 4, 9-11</i>	21
4	Identifying hazards, assessing and evaluating risk	12	<i>HSP 5-6</i>	23
5	Risk control	8	<i>HSP 5, 8, 13</i>	25
6	Organisational factors	10	<i>HSP 2, 4</i>	27
7	Human factors	12	<i>HSP 2, 4, 5</i>	30
8	Principles of health and safety law	12	<i>HSP 5, 12</i>	33
9	Criminal law	9	<i>HSP 4-5, 12</i>	36
10	Civil law	12	<i>HSP 4-5, 12</i>	38
Minimum unit tuition time		91		
Recommended private study time		75		

Unit B: Hazardous agents in the workplace

Element Number	Element Title	Recommended hours	Relevant Proskills units and elements	Page
1	Principles of toxicology and epidemiology	8	<i>HSP 6, 13</i>	41
2	Hazardous substances and other chemicals – assessment of risk	5	<i>HSP 4, 6</i>	44
3	Hazardous substances and other chemicals – engineering controls and personal protective equipment	4	<i>HSP 5-7, 13</i>	47
4	Monitoring and measuring	6	<i>HSP 5, 7, 8</i>	49
5	Biological agents	7	<i>HSP 5, 7, 8</i>	51
6	Physical agents 1 – noise and vibration	10	<i>HSP 5-8</i>	53
7	Physical agents 2 - radiation	9	<i>HSP 5-8</i>	57
8	Psychosocial agents	5	<i>HSP 2, 5-8, 13</i>	60
9	Musculoskeletal risks and controls	4	<i>HSP 5-8</i>	63
10	Work environment risks and controls	5	<i>HSP 5-8, 13</i>	65
11	Managing occupational health	8	<i>HSP 2-3, 5-8, 11, 13</i>	68
Minimum unit tuition time		71		
Recommended private study time		50		

Unit C: Workplace and work equipment safety

Element Number	Element Title	Recommended hours	Relevant Proskills units and elements	Page
1	General workplace issues	7	<i>HSP 6</i>	71
2	Principles of fire and explosion	6	<i>HSP 5-6, 13</i>	74
3	Workplace fire risk assessment	6	<i>HSP 4-6</i>	77
4	Storage, handling and processing of dangerous substances	7	<i>HSP 4-5, 10</i>	80
5	Work equipment (general)	9	<i>HSP 4-8, 13</i>	83
6	Work equipment (workplace machinery)	11	<i>HSP 4-8, 13</i>	85
7	Work equipment (mobile, lifting and access)	6	<i>HSP 4-8, 13</i>	88
8	Electrical safety and Electricity at Work Regulations 1989	7	<i>HSP 4-8, 13</i>	91
9	Construction hazards and controls	7	<i>HSP 4-5, 10</i>	94
10	Workplace transport and driving for work	4	<i>HSP 4-6, 8</i>	97
11	Pressure system hazards and controls	5	<i>HSP 5, 7-8</i>	99
Minimum unit tuition time		75		
Recommended private study time		50		

Unit D: Application of health and safety theory and practice

Element Number	Element Title	Recommended hours	Relevant Proskills units and elements	Page
1	Application of health and safety theory and practice	6	HSP 1-13	101
	Minimum unit tuition time	6		
	Recommended private study time	50		
	<i>Minimum total tuition time</i>	<i>243</i>		
	<i>Recommended total private study time</i>	<i>225</i>		
	<i>Total overall hours</i>	<i>468</i>		

4.1 Unit A: Managing health and safety

Overall learning outcome

On completion of this unit, candidates will be able to demonstrate their understanding of the domain knowledge covered through:

1. The application of knowledge to familiar and unfamiliar situations; and
2. The critical analysis and evaluation of information presented in both quantitative and qualitative forms.

In addition each element has specific learning outcomes.

Element A1: Principles of health and safety management

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- A1.1 Explain the moral, legal and economic reasons for the effective management of health and safety
- A1.2 Outline the societal factors which influence health and safety standards and priorities
- A1.3 Explain the principles and content of effective health and safety, quality, environmental, and integrated management systems with reference to recognised models and standards
- A1.4 Outline the role and responsibilities of the health and safety practitioner.

Content

A1.1 Reasons for the effective management of health and safety

- Moral reasons:
 - duty of reasonable care
 - unacceptability of putting health and safety of people at risk
 - society's attitude to moral obligations
 - national accident/incident and ill-health statistics
 - higher-risk industries
 - effect of size of organisation on accident/incident rates (eg, fatalities higher in small businesses).

- Legal reasons:
 - preventive (by enforcement notices)
 - punitive (through criminal sanctions)
 - compensatory effects of law
 - principle of self-regulation.
- Economic reasons:
 - costs associated with accident/incidents and ill-health and their impact on society and on organisations
 - insured and un-insured costs
 - the financial benefits of effective health and safety management.

A1.2 Societal factors which influence health and safety standards and priorities

- Factors:
 - economic climate, government policy and initiatives (eg, 'Working for a Healthier Tomorrow')
 - industry/business risk profile
 - globalisation of business
 - migrant workers
 - national level of sickness absence
 - incapacity.
- Principle of 'corporate social responsibility'.

A1.3 Effective health and safety management systems

- The meaning of: 'hazard', 'risk', 'danger'
- Legal requirements relating to health and safety policies and arrangements
- Key elements of an effective health and safety management system
- Structure and content of management system models: HSG65 and BS OHSAS 18001
- Principles of quality management systems (BS EN ISO 9001) and environmental management systems (BS EN ISO 14001)
- Benefits and limitations of integration of quality, environmental, and health and safety management systems
- Influence of the Financial Reporting Council Guidance on Internal Control (formerly the Turnbull guidance) on health and safety management
- Principles of the HSE/IOD guidelines 'Leading health and safety at work'.

A1.4 Role and responsibilities of the health and safety practitioner

- The role of health and safety practitioners in the design, implementation, evaluation and maintenance of health and safety management systems

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- Role of the health and safety practitioner in influencing ownership and conduct at all levels of an organisation
- Meaning of the term 'competence' and the requirements for continuing professional development for health and safety practitioners to maintain competence
- The need for health and safety practitioners to evaluate and develop their own practice including the need to consult with others if appropriate, eg, when outside of competence
- Meaning of the term 'ethics'
- Practical application of ethical principles (eg, honesty, respect, integrity) that underpin professional (health and safety practitioner) codes of conduct
- Dealing with conflicts of interest.

Relevant statutory provisions

Management of Health and Safety at Work Regulations 1999 – Regulations 3, 4, 5 and 7
Health and Safety at Work etc. Act 1974 – section 2.

Tutor references

Making an impact on SME compliance behaviour: An evaluation of the effect of interventions upon compliance with health and safety legislation in small and medium sized enterprises RR366 : <http://www.hse.gov.uk/research/rrpdf/rr366.pdf>

Internal Control. Revised Guidance for Directors on the Combined Code October 2005 (the [Financial Reporting Council guidance on internal control](http://www.frc.org.uk/corporate/internalcontrol.cfm)):
www.frc.org.uk/corporate/internalcontrol.cfm

IOSH Code of Conduct

IIRSM Code of Ethics Corporate Manslaughter and Corporate Homicide Act 2007

Leading health and safety at work (INDG 417) HSE Books, ISBN 978 0 7176 6267 8

Managing Health and Safety in Construction (ACOP) (HSG224), HSE Books,
ISBN: 0-7176-2139-1

Health and Safety in Construction (Guidance) (HSG150rev), HSE Books, ISBN: 0-7176-0716-X

OHSAS 18001 Occupational health and safety management systems – Requirements

Recommended tuition time not less than 5 hours

Element A2: Loss causation and incident investigation

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- A2.1 Explain theories of loss causation
- A2.2 Explain the quantitative analysis of accident/incident and ill-health data, limitations of their application, and their presentation in numerical and graphical form
- A2.3 Explain the statutory and the internal reporting and recording systems for injuries, ill-health, dangerous occurrences and near misses
- A2.4 Explain loss investigations; the requirements, benefits, the procedures, the documentation, and the involvement of and communication with relevant staff and representatives.

Content

A2.1 Theories of loss causation

- Accident/incident ratio studies, their use and their limitations
- Domino and multi-causality theories, immediate and underlying causes
- Latent and active failures – Reason's model of accident causation.

A2.2 Quantitative analysis of accident and ill-health data

- Methods of calculating loss rates from raw data: accident/incident frequency rate, accident incidence rate, accident severity rate, ill-health prevalence rate
- The application and limitations of simple statistical and epidemiological analyses in the identification of patterns and trends
- Presenting and interpreting loss event data in graphical and numerical format, using examples of histograms, pie charts and line graphs
- Principles of statistical variability, validity and the use of distributions. (eg, sampling a population, errors in data).

A2.3 Reporting and recording of injuries, ill-health, dangerous occurrences and near misses

- Statutory reporting requirements and procedures
- Internal reporting and recording systems.

A2.4 Loss investigations

- Implied legal requirements
- Purposes of investigation including:
 - discovery of underlying causes
 - prevention of recurrence
 - legal liability
 - data gathering
 - identification of trends.
- Investigation procedures and methodologies to include:
 - accident/incident report forms
 - gathering of relevant information
 - interviewing witnesses
 - analysis of information
 - involvement of managers, supervisors, employees' representatives and others in the investigation process.
- Communications with a particular focus on remedial actions and lessons learnt
- Root cause analysis methods such as fault tree analysis as investigative tools (reference Element A4).

Relevant statutory provisions

Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995
Social Security (Claims and Payments) Regulations 1979 (Regulations 24 and 25)

Tutor references

Investigating accidents and incidents - a workbook for employers, unions, safety representatives and safety professionals (HSG245), ISBN 0 7176 2827 2, HSE Books
Reason J (1997) 'Managing the Risks of Organisational Accidents'
Successful Health and Safety Management (HSG65), HSE Books, ISBN 0-7176-1276-7
An Introduction to Health and Safety (INDG259 Rev 1) HSE Books, ISBN 0-7176-2685-7

Recommended tuition time not less than 5 hours

Element A3: Measuring and reviewing health and safety performance

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- A3.1 Explain the purpose of performance measurement in relation to health and safety objectives and arrangements
- A3.2 Explain the need for, and the objectives and limitations of, health and safety monitoring systems
- A3.3 Describe the variety of monitoring and measurement techniques
- A3.4 Explain the requirements for reviewing health and safety performance.

Content

A3.1 Purpose of performance measurement

- The assessment of the effectiveness and appropriateness of health and safety objectives and arrangements, including control measures
- The making of recommendations for review of current health and safety management systems.

A3.2 Monitoring systems

- Need for a range of both active and reactive measures to determine whether health and safety objectives have been met.
- Objectives of active monitoring – to check that health and safety plans have been implemented and to monitor the extent of compliance with the organisation's systems/procedures and legislative/technical standards.
- Objectives of reactive monitoring – to analyse data relating to accidents, ill-health and other loss causing events.
- Limitations of placing reliance on accident/incident and ill-health data.
- The distinction between, and applicability of, active/reactive, objective/subjective and qualitative/quantitative performance measures.

A3.3 Monitoring and measurement techniques

- The range of measures available in order to evaluate the health and safety performance of an organisation and how these can be utilised to review the effectiveness of the health and safety management system
- Role and purpose of health and safety audits, workplace inspections, safety tours, safety sampling, and safety surveys
- The key elements and features of health and safety audits, workplace inspections, safety tours, safety sampling, and safety surveys
- In-house and proprietary audit systems and processes; the use of computer technology to assist in data storage and analysis and the production of reports
- Comparison of previous performance data with that of similar organisations/industry sectors and with national performance data. Use of benchmarking, eg, Corporate Health & Safety Performance Index (CHaSPI).

A3.4 Reviewing health and safety performance

- Need for formal and informal reviews of performance
- Process of review
- Inputs to a review process – internal performance data, health and safety objectives, organisational arrangements and change, external standards and expectations
- Outputs from a review process – actions and improvement plans, stakeholder reports, performance targets.

Tutor references

<http://www.chaspi.info-exchange.com>

Recommended tuition time not less than 6 hours

Element A4: Identifying hazards, assessing and evaluating risks

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- A4.1 Describe how to use internal and external sources of information in the identification of hazards and the assessment of risk
- A4.2 Outline a range of hazard identification techniques
- A4.3 Explain how to assess and evaluate risk and to implement a risk assessment programme
- A4.4 Explain the principles and techniques of failure tracing methodologies with the use of calculations.

Content

A4.1 Sources of information in the identification of hazards and the assessment of risk

- Accident/incident and ill-health data and rates – incidence, frequency, severity, prevalence
- External information sources (eg, HSE and other relevant governmental agencies, European Safety Agency, International Labour Organisation - ILO, World Health Organisation - WHO, professional and trade bodies)
- Internal information sources – collection, provision, analysis and use of damage, injury, and ill-health data, near-miss information and maintenance records
- Uses and limitations of external and internal information sources.

A4.2 Hazard identification techniques

- Use of observation, task analysis, checklists and failure tracing techniques such as hazard and operability studies (see 4.4)
- Importance of employee input.

A4.3 Assessment and evaluation of risk

- Key steps in a risk assessment process including ensuring comprehensive coverage of risks, identifying hazards, persons at risk, factors affecting probability and severity, risk evaluation and required risk control standards, formulation of actions, prioritisation of actions and recording requirements
- Meaning of 'suitable and sufficient'
- Differences between, and principles of, qualitative, semi-quantitative and quantitative assessments
- Organisational arrangements for implementing and maintaining an effective risk assessment programme including procedures, recording protocols, training, competence, responsibilities, authorisation and follow-up of actions, monitoring and review
- Acceptability/tolerability of risk – principles in HSE's 'Reducing risks, protecting people' (R2P2).

A4.4 Failure tracing methodologies

- Principles and techniques of failure tracing methods in the assessment of risk:
 - hazard and operability studies
 - fault tree analysis
 - event tree analysis.

Relevant statutory provisions

Management of Health and Safety at Work Regulations 1999 – Regulation 3

Tutor references

Reducing risks, protecting people (R2P2). HSE Books ISBN 0 7176 2151 0

Recommended tuition time not less than 12 hours

Element A5: Risk Control

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- A5.1 Outline common risk management strategies
- A5.2 Outline factors to be taken into account when selecting risk controls
- A5.3 Explain the development, main features and operation of safe systems of work and permit-to-work systems.

Content

A5.1 Common risk management strategies

- The concepts of avoidance, reduction, transfer and retention with/without knowledge within a health and safety management programme, with relevant examples (eg, redesign of tasks, automation of process, insurance policies, use of specialist contractors).
- Factors to be considered in the selection of an optimum solution based on relevant risk data.

A5.2 Factors to be taken into account when selecting risk controls

- The general principles of prevention in the Management of Health and Safety at Work Regulations
- Categories of control measure
 - technical, eg design, fencing, ventilation
 - procedural, eg systems of work, maintenance
 - behavioural, eg information and training.
- General hierarchy of control measures – form and justification
- Factors affecting choice of control measures – long term/short term, applicability, practicability, cost, effectiveness of control, legal requirements and associated standards, competence of personnel and training needs relevant to preferred controls
- Cost-benefit analysis in relation to risk control decisions (organisational, design, planning, operational).

A5.3 Safe systems of work and permit-to-work system

- Safe systems of work: meaning; legal and practical requirements; components (people, equipment, materials, environment); development and implementation
- The use of risk assessment in the development of safe systems of work and safe operating procedures
- Permit-to-work systems – essential features, general application, operation and monitoring.

Relevant statutory provisions

Management of Health and Safety at Work Regulations 1999 – Regulations 4 (and Schedule 1), 5 and 7

Recommended tuition time not less than 8 hours

Element A6: Organisational factors

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- A6.1 Explain the internal and external influences on health and safety in an organisation
- A6.2 Outline the organisation as a system, the different types of organisation, their characteristics and relationship to individuals within them
- A6.3 Identify the various categories of third parties in a workplace – the relevant legislative requirements, responsibilities and controls
- A6.4 Explain the role, influences on and procedures for formal and informal consultation with employees in the workplace
- A6.5 Outline the development of a health and safety management information system, the relevant legal requirements, and the data it should contain
- A6.6 Explain health and safety culture and climate
- A6.7 Outline the factors which can both positively and negatively affect health and safety culture.

Content

A6.1 Internal and external influences

- Internal influences on health and safety within an organisation – eg, finance, production targets, trade unions, organisational goals and culture
- External influences on health and safety within an organisation – eg, legislation, Parliament/HSE, enforcement agencies, courts/tribunals, contracts, clients/contractors, trade unions, insurance companies, public opinion.

A6.2 Types of organisations

- The concept of the organisation as a system
- Organisational structures and functions – including formal and informal; large or small; organisation charts, role of management
- Potential conflict between organisational goals and those of the individual
- The integration of the goals of the organisation with the needs of the individual – authority, responsibility, accountability.

A6.3 Third party control

- Third parties: contractors, visitors, trespassers and members of the public
- Criminal law duties owed to third parties under the Health and Safety at Work etc Act 1974 and the Management of Health and Safety at Work Regulations.
- Internal rules and procedures concerned with the selection, appointment and control of contractors.
- Responsibilities for control of risk associated with contractors and visitors.
- Requirements to provide information relating to hazards/risks to third parties.

A6.4 Consultation with employees

- The role and benefits of consultation within the workplace
- Formal consultation:
 - functions and rights of representatives on health and safety (trade union-appointed, elected)
 - functions of a safety committee
 - formal consultation directly with employees.
- Informal consultation:
 - discussion groups, safety circles, departmental meetings, employee discussion
 - behavioural aspects associated with consultation – peer group pressures, danger of tokenism, potential areas of conflict.

A6.5 Development of a health and safety management information system – the relevant legal requirements and the data it should contain

- The development of a health and safety management information system within the workplace
- Types of data within a health and safety management information system: eg, loss event data, cost data, suppliers' data, results of audits/inspections
- Legal requirements and practical arrangements for providing health and safety information:
 - internally to employees, temporary workers, contractors, etc.
 - externally to customers, suppliers, enforcement authorities, employment agencies, members of the public and others.

A6.6 Health and safety culture and climate

- Meaning of 'health and safety culture' and 'climate'
- Impact of organisational cultural factors and associated values on individual behaviour
- Indicators of culture
- Correlation between health and safety culture/climate and health and safety performance
- Measurement of the culture and climate, eg, safety climate assessment tools, perception surveys, findings of accident/incident investigations, effectiveness of communication, evidence of commitment by personnel at all levels in the organisation.

A6.7 Factors affecting health and safety culture

- Factors that may promote a positive health and safety culture (eg, management commitment and leadership, high business profile to health and safety, provision of information, involvement and consultation, training, promotion of ownership, setting and meeting targets).
- Factors that may promote a negative health and safety culture (eg, organisational change, lack of confidence in organisation's objectives and methods, uncertainty, management decisions that prejudice mutual trust or lead to 'mixed signals' regarding commitment).
- Effecting cultural change: planning and communication, strong leadership, the need for a gradualist (step-by-step) approach, direct and indirect action to promote change (including cultural dividends from risk assessment), strong employee engagement, ownership at all levels, training and performance measurements, importance of feedback.
- Problems and pitfalls (eg, attempts to change culture too rapidly, adopting too broad an approach, absence of trust in communications, resistance to change).

Relevant statutory provisions

Health and Safety at Work, etc. Act 1974 – sections 2, 3 and 4

Management of Health and Safety at Work Regulations 1999 – Regulations , 10, 11 and 12

Safety Representatives and Safety Committees Regulations 1977

Health and Safety Information for Employees Regulations 1989

Health and Safety (Consultation with Employees) Regulations 1996

Recommended tuition time not less than 10 hours

Element A7: Human factors

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- A7.1 Outline psychological and sociological factors which may give rise to specific patterns of safe and unsafe behaviour in the working environment
- A7.2 Explain the nature of the perception of risk and its relationship to performance in the workplace
- A7.3 Explain the classification of human failure
- A7.4 Explain appropriate methods of improving individual human reliability in the workplace
- A7.5 Explain how organisational factors could contribute to improving human reliability
- A7.6 Explain how job factors could contribute to improving human reliability
- A7.7 Outline the principles, conditions and typical content of behavioural change programmes designed to improve safe behaviour in the workplace.

Content

A7.1 Human psychology, sociology and behaviour

- Meaning of the terms : psychology and sociology
- The influence on human behaviour of personality, attitude, aptitude and motivation
- Key theories of human motivation: FW Taylor, Mayo (Hawthorne experiments), Maslow (hierarchy of needs), McClelland, Herzberg, McGregor and their relevance to health and safety
- Effects on behaviour at work of experience, social and cultural background, education and training
- On-line and off-line processing; knowledge, rule and skill-based behaviour (Rasmussen)
- Individual decision-making/problem-solving processes (Rasmussen and Reason).

A7.2 Perception of risk

- Human sensory receptors and their reaction to stimuli, sensory defects and basic screening techniques.
- Process of perception of danger, perceptual set and perceptual distortion.
- Errors in perception caused by physical stressors.

- Perception and the assessment of risk, perception and the limitations of human performance, filtering and selectivity as factors for perception.
- Perception and sensory inputs, principles of the Hale & Hale model
- Individual behaviour in the face of danger, principles of the Hale & Glendon model.

A7.3 Human failure classification

- HSG48 classification of human failure.
- Contribution of human failure to serious incidents, eg Kegworth, Herald of Free Enterprise, Piper Alpha, Ladbroke Grove, Glenridding Beck, Milford Haven, Chernobyl.

A7.4 Improving individual human reliability in the workplace

- Motivation and reinforcement; workplace incentive schemes; job satisfaction and appraisal schemes; selection of individuals – matching skills and aptitudes; training and competence assessment; fitness for work and health surveillance; support for ill-health and stress.

A7.5 Organisational factors

- The effect of weaknesses in the safety management system on the probability of human failure, eg, inadequacies in the setting of standards, policy, planning, information responsibilities or monitoring
- The influence of safety culture on behaviour and the effect of peer group pressure and norms
- The influence of formal and informal groups within an organisation
- Organisational communication mechanisms and their impact on human failure probability, eg, shift handover communication, organisational communication routes and their complexity, reliability and degree of formality
- Procedures for resolving conflict and introducing change.

A7.6 Job factors

- Effect of job factors on the probability of human error (eg, task complexity, patterns of employment, payment systems, shift work)
- Application of task analysis
- The role of ergonomics in job design:
 - influence of process and equipment design on human reliability
 - the employee and the workstation as a system
 - elementary physiology and anthropometry
 - the degradation of human performance resulting from poorly designed workstations.
- Ergonomically designed control systems in relation to human reliability – eg, examples of applications: production process control panels, crane cab controls, aircraft cockpit, CNC lathe, etc.
- The relationship between physical stressors and human reliability.

- The effects of fatigue and stress on human reliability.

A7.7 Behavioural change programmes

- Principles of behavioural change programmes
- Organisational conditions needed for success in behavioural change programmes
- Examples of typical behavioural change programme contents.

Tutor references

Behavioural safety; Kicking bad habits (06.1) : IOSH

Reducing error and influencing behaviour (HSG48). HSE Books ISBN 9780717624522

Recommended tuition time not less than 12 hours

Element A8: Principles of health and safety law

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- A8.1 Explain the sources and types of law in force in the UK relevant to health and safety
- A8.2 Explain the concept of absolute and qualified duties in relation to health and safety legislation
- A8.3 Outline the influence and role of the European Union on UK health and safety legislation
- A8.4 Describe the status and procedure for the creation of UK Acts, Regulations and Orders
- A8.5 Describe the structure and functions of courts and related institutions in the UK
- A8.6 Outline the principles of the law of contract and its application to health and safety issues
- A8.7 Explain the principles of employment and discrimination law as it affects health and safety issues.

Content

A8.1 Sources and types of law

- Sources of law:
 - common law: nature and development, judicial precedent
 - statute law: European Directives and Regulations, UK Acts of Parliament and Regulations. Prescriptive and goal-setting legislation.
- Types of law:
 - criminal law: purpose, sanctions
 - civil law: purpose, types of remedy.
- Burden of proof – civil and criminal law.

A8.2 Absolute and qualified duties

- The concept of absolute and qualified duties.
- 'Absolute', 'practicable' and 'reasonably practicable' with reference to relevant decided cases.

A8.3 Role of the European Union

- Influence and role of the European Union and its main institutions as they affect UK health and safety legislation

- The status and procedure for the creation of instruments in EU law – Treaties, Regulations, Directives and Decisions
- Directives – role of Parliament, Council and Commission in the Co-Decision Procedure and the significance of Qualified Majority Voting. Distinction between directives made under Article 95 and Article 137 of the Treaty of Rome. Sources of information on pending EU law. UK law in response to EU Directives
- The role of the European Court of Justice (ECJ) and procedure for referring cases; how decisions of the ECJ are enforced through courts of Member States; effect of decisions of the ECJ on UK law.

A8.4 UK Acts, Regulations and Orders

- The status and procedure for making UK Acts of Parliament, Regulations and Orders:
 - Acts of Parliament – the functions of green and white papers, progression of a Bill through Parliament
 - Regulations – procedure under section 15 of the Health and Safety at Work etc. Act 1974 and permissible subject matter of Regulations, role of the Secretary of State and the HSE in making Regulations; the various stages of consultation.
- The use of socio-technical cost-benefit analysis in the economic assessment of proposed legislative/regulatory change.

A8.5 Structure and function of the courts and related institutions

- The functions, jurisdiction and powers of:
 - Employment Tribunals
 - Magistrates' Courts
 - County Courts
 - High Court
 - Crown Court
 - Court of Appeal, (Court of Session, High Court of Justiciary, Sheriff Courts, District and Justice of the Peace Courts in Scotland)
 - Supreme Court
 - European Court of Justice.
- The basic procedures for bringing prosecutions for breaches of health and safety legislation and for pursuing civil actions (cross-refer to Element A10).
- The role of Employment Tribunals in matters of health and safety.
- The appeals system: routes and grounds of appeal.

A8.6 Principles of the law of contract

- Law of contract:
 - meaning of contract including: written, verbal, express and implied
 - principles of the law of contract and their application to health and safety issues; the relationship between producer and vendor, vendor and consumer, client and contractor; exclusion clauses and effect of the Unfair Contract Terms Act 1977.

A8.7 Principles of employment and discrimination law

- Purpose of contract of employment.
- Employment law as it relates to health and safety issues in connection with:
 - disciplinary procedures
 - fair and unfair dismissal
 - age, sex, race and disability discrimination
 - undertaking safety roles at work
 - disclosure of wrong-doing at work.
- Situations where it is lawful to discriminate and protection for those undertaking safety roles at work or disclosing wrong-doing at work with reference to:
 - Employment Rights Act 1996
 - Trade Union and Labour Relations (Consolidation) Act 1992
 - Sex Discrimination Acts 1975 and 1986
 - Race Relations Act 1976
 - Disability Discrimination Act 1995
 - The Employment Equality (Age) Regulations 2006
 - Public Interest Disclosure Act 1998.

Decided cases

- *Adsett v K&L Steelfounders & Engineers Ltd* [1953] 2 All ER 320
- *Edwards v National Coal Board* [1949] 1 All ER 743
- *Marshall v Gotham & Co Ltd* [1954] AC 360
- *Summers (John) & Sons v Frost* [1955] AC 740

NB: Marks will be awarded for other **relevant** case law quoted in examinations.

Recommended tuition time not less than 12 hours

Element A9: Criminal law

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- A9.1 Explain the key requirements of the Health and Safety at Work etc Act 1974 and the Management of Health and Safety at Work Regulations 1999
- A9.2 Explain the status of Approved Codes of Practice and guidance and the statutory procedures for making Approved Codes of Practice
- A9.3 Explain the responsibilities and powers of enforcing agencies and officers and the range of options related to enforcement action, their implications and appeal procedures.

Content

A9.1 The Health and Safety at Work etc. Act 1974 and the Management of Health and Safety at Work Regulations 1999

- The requirements and application of sections 2-4 and 6-9 of the Health and Safety at Work etc. Act 1974, relationship between general and specific duties.
- The requirements and application of the Management of Health and Safety at Work Regulations 1999.
- Implications of sections 36 and 37 of the Health and Safety at Work etc. Act and regulation 21 of the Management of Health and Safety at Work Regulations with reference to relevant decided cases.

A9.2 Approved Codes of Practice and guidance

- Purpose, role, structure, application and status of approved codes of practice and HSE guidance notes.
- Statutory procedures for making approved codes of practice.

A9.3 Enforcement of health and safety law

- Identification of authorities empowered to enforce health and safety legislation.
- Division of responsibilities between enforcing authorities
- Powers of enforcing authorities and their inspectors (Health and Safety at Work etc. Act section 20 and 25)
- Obligations of enforcing officers: duty to give information to employees or their representatives; duty not to disclose information (Health and Safety at Work etc. Act section 28)
- Offences and maximum penalties under the law (Health and Safety at Work etc. Act section 33); offences for which imprisonment is, and is not, a form of sanction

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- Options for enforcement action with reference to HSE Enforcement Guide (www.hse.gov.uk/enforce/enforcementguide/): prosecution – summary, indictable and triable either way offences; formal cautions; enforcement notices – types, purpose, status, conditions for being served, grounds for appeal, appeal procedures, effects of appeal (Health and Safety at Work Act sections 21-24 and 39).
- Principles of enforcement by safety case, eg, Control Of Major Accidents Hazards; by registration of individuals, eg, gas safety, and by licensing, eg, asbestos or adventure activities
- The effect on criminal proceedings of section 40 of the Health and Safety at Work Act
- The application of common law manslaughter (culpable homicide in Scotland) and the Corporate Manslaughter and Corporate Homicide Act 2007 to work related accident/incidents. Legal criteria for prosecution, enforcement and prosecution responsibilities
- Relevant example prosecutions.

Decided cases

- Armour v Skeen [1977] IRLR 310
- R v Associated Octel Co Ltd [1996] 4 All ER 846
- R v British Steel plc [1995] IRLR 310
- R v HTM [2006] EWCA Crim 1156
- R v Nelson Group Services (Maintenance) Ltd [1998] 4 All ER 420
- RvP[2007] EWCA Crim 1937
- R v Swan Hunter Shipbuilders Ltd and Another [1982] 1 All ER 264.

NB: Marks will be awarded for other **relevant** case law quoted in examinations.

Recommended tuition time not less than 9 hours

Element A10: Civil law

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- A10.1 Explain the duties owed at common law
- A10.2 Explain the criteria required to establish a successful civil action for breach of statutory duty, the main defences available and the procedure for assessment of damages under civil law
- A10.3 Outline the main civil law statutory duties owed by the occupiers of premises to lawful and unlawful visitors.

Content

A10.1 Common law duties

- Principles of tort (delict – in Scottish law) of negligence:
 - duty of care owed
 - breach of the duty of care
 - causal link between the breach and the loss suffered
 - foreseeability of the type of damage.
- Main defences to claims of negligence:
 - denial
 - no duty owed
 - no breach of duty (with reference to foreseeability, reasonableness)
 - breach did not lead to damage
 - type of damage not foreseeable
 - volenti non fit injuria
 - contributory negligence.
- Concept of 'duty of care':
 - to whom a duty is owed (the 'neighbour test')
 - the duty of care owed by:
 - o designers, manufacturers and suppliers to customers/users
 - o occupiers of premises to those using or visiting the premises
 - o contractors to clients and vice versa
 - o extent of duty (reasonableness, foreseeability).

- Common law duties owed by employers to employees to provide:
 - a safe place of work and safe access and egress
 - safe systems of work
 - safe plant, equipment and materials
 - instruction, training and supervision
 - competent fellow employees.
- Damage for which the tortfeasor is liable and relevance of damage of foreseeable type, date of knowledge of risk.
- Greater duty of care to more vulnerable individuals
- Concept of vicarious liability.

A10.2 Breach of statutory duty, defences and damage

- Principle that a breach of a statutory duty may give rise to civil liability. Criteria for a successful action
- The main defences to the tort (delict) of breach of statutory duty:
 - statute-barred (relevance of section 47 of the Health and Safety at Work Act 1974 and reference to the exclusions in the Management of Health and Safety at Work Regulations 1999 and the Construction (Design and Management) Regulations 2007
 - duty not on the defendant
 - no breach of duty
 - injured party not within the class of persons protected by the statute
 - harm not of the type that the statute was designed to prevent
 - no causal connection between the breach and the loss suffered.
- Factors to be considered in the assessment of damages; general and special
- Contributory negligence and its effects
- The concept of joint tortfeasors:
 - meaning of joint and several liabilities
 - recovery of damages from joint tortfeasor
- Personal Injury Action Protocol under the Civil Procedures Rules.

A10.3 Occupier's liability

The main provisions of the Occupiers' Liability Acts 1957 and 1984 or the Occupiers' Liability (Scotland) Act 1960.

Decided cases:

- Bradford v Robinson Rentals Ltd [1967] 1 All ER 267
- Caparo Industries Plc v Dickman [1990] 2 AC 605
- Corn v Weirs Glass (Hanley) Ltd [1960] 2 All ER 300
- Davie v New Merton Board Mills Limited [1958] 1 All ER 67
- Donaldson v Hays Distribution Services Ltd 2005 SLT 733

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- Donoghue v Stevenson [1932] AC 562
- Herrington v British Railways Board [1972] AC 877
- Latimer v AEC Ltd [1953] 2 All ER 449, HL
- Mersey Docks and Harbour Board v Coggins and Griffith (Liverpool) Ltd [1946] 2 All ER 345
- Paris v Stepney Borough Council [1951] 1 All ER 42, HL
- Rose v Plenty [1976] 1 AER 97
- Sutherland v Hatton and others [2002] EWCA Civ 76
- Thompson and others v Smiths Ship Repairers (North Shields) [1984] 1 All ER 881
- Wilsons and Clyde Coal Co v English [1938] 3 All ER 628.

NB: Marks will be awarded for other **relevant** case law quoted in examinations.

Recommended tuition time not less than 12 hours

4.2 Unit B: Hazardous agents in the workplace

Overall learning outcome

On completion of this unit, candidates should be able to demonstrate understanding of the domain knowledge covered through:

1. The application of knowledge to familiar and unfamiliar situations; and
2. The critical analysis and evaluation of information presented in both quantitative and qualitative forms.

In addition each element has specific learning outcomes.

Element B1: Principles of toxicology and epidemiology

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quant:

- B1.1 Outline the legal framework as it applies to chemicals
- B1.2 Outline human anatomical systems and sensory organs
- B1.3 Describe the main effects and routes of attack of chemicals on the human body
- B1.4 Explain the health effects of chemicals used in the workplace
- B1.5 Explain the principles of epidemiology and the principles of toxicological data to the identification of work related ill-health.

Content

B1.1 The legal framework

- Overview of legislation controlling the use of chemicals in the workplace as contained within: Control of Substances Hazardous to Health Regulations 2002; Control of Lead at Work Regulations 2002; Control of Asbestos Regulations 2006
- Transition period of legislation – Chemicals (Hazard Information and Packaging) Regulations 2009 (CHIP 4) will eventually be replaced by the European Regulation on the Classification, Labeling and Packaging of Substances and Mixtures (CLP) Regulation, to be used for the classification of chemicals, data gathering and communication of hazards (eg, the use of Safety Data Sheets in COSHH assessments)

- The risk assessment framework, as it applies to chemicals:
 - identify the hazards
 - decide who might be harmed and how
 - evaluate the risks and decide on precautions
 - record the findings and implement them
 - review and update as necessary.

B1.2 Human anatomical systems and sensory organs

- The human anatomical systems: respiratory, digestive, circulatory, nervous systems, the skin and eyes.
- In relation to attack by substances, the concepts of target organs and target systems; local and systemic effects.

B1.3 Main effects and routes of attack of chemicals

- The main routes, methods of entry into, and effects of chemicals on, the human body: eyes, nose, mouth, ears, inhalation, ingestion, skin pervasion and injection.
- The influence of physical form (dust, fibre, mist, liquid, gas etc) and properties (eg solubility) on entry routes available to substances.
- Distinction between inhalable and respirable dust.
- The body's defensive responses (innate and adaptive), with particular reference to the respiratory system.

B1.4 Health effects of chemicals used in the workplace

- Duty of suppliers to classify dangerous substances and preparations with reference to The Chemicals (Hazard Information and Packaging) for Supply Regulations 2009) CHIP.
- Categories of danger for health effects (meaning of terms, with typical workplace examples) – very toxic, toxic, harmful, corrosive, irritant, sensitising, carcinogenic, mutagenic, toxic for reproduction. Specific workplace examples to include: trichloroethylene, asbestos, isocyanates, siliceous dusts, lead (and compounds), sulphuric acid, sodium hydroxide, chromium compounds, hard wood dust.
- Dermatitis and workplace examples of typical causative agents.
- The role of the approved classification and labelling guide and the assignment of Risk Phrases.
- The role of harmonised classifications (ref table 3.2 of part 3 of annex VI of The CLP Regulation (EC 1272/2008)) (replacing CHIP).

B1.5 Principles of epidemiology and the principles of toxicological data

- Purpose of toxicology and epidemiology and how data is used in labelling and classification.
- How basic data about chemical hazards is generated (Ref Article 13 of REACH (EC 1907/2006)).
- Test methods and legal requirements to test new substances.

- Human epidemiological investigations: The use and limitations of case control studies and cohort studies (retrospective and prospective).
- Vertebrate animal testing: distinction between acute and chronic testing and their value and limitations (ref the Test Methods Regulation EC 440/2008).
- The meaning and significance of the concepts of 'dose-response relationship', NOAEL, LD50, LC50.
- Alternatives to vertebrate animal testing, with reference to the Ames test, Quantitative Structure Activity Relationship models (QSAR), 'read-across'.
- Communication of chemical hazards to users (Ref CHIP, the CLP Regulation (EC 1272/2008)) and Articles 14 and 31 of REACH Regulation (EC 1907/2006) – in respect of the typical content (format and types of data) of labels, Safety Data Sheets and Chemical Safety Assessments/Reports for dangerous substances and preparations.
- Application of epidemiological techniques to health surveillance of a workplace.

Relevant statutory provisions

Control of Substances Hazardous to Health Regulations 2002 (as amended)

Chemicals (Hazard Information and Packaging for Supply) Regulations 2009

Control of Lead at Work Regulations 2002

Control of Asbestos Regulations 2006

Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH Regulation, EC 1907/2006)

The Management of Health and Safety at Work Regulations 1999 (as amended)

Recommended tuition time not less than 8 hours

Element B2: Hazardous substances and other chemicals – assessment of risk

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- B2.1 Outline the factors to consider when assessing risks from hazardous substances
- B2.2 Explain the control measures for hazardous substances
- B2.3 Explain the additional requirements for asbestos and lead.

Content

B2.1 Factors to consider when assessing risks

- The factors to be considered in the assessment of risks to health from hazardous substances:
 - the hazardous properties of the substance, including health effects
 - level of exposure (amounts and concentrations used - specifically what is likely to get into the air and be inhaled (volatility (liquids) or dustiness (solids) or come into contact with skin/eyes or be swallowed)
 - nature of the task, methods used etc
 - numbers of people exposed
 - type and duration of exposure
 - frequency of exposure
 - the effect of mixtures (antagonism eg poison vs antidote, additivity and potentiation/synergy)
 - particular activities where exposure is likely to be unusually high eg maintenance and accidental release
 - thresholds of exposure (the amount needed to cause harm)
 - effectiveness of existing control measures
 - results from relevant health surveillance and exposure monitoring
 - individual susceptibilities (eg, atopic persons, women of child bearing capacity, age, sensitisation).

B2.2 Control measures

- Adequate control of carcinogens, mutagens and asthmagens (as low as is reasonably practicable) (COSHH, Regulation 7)
- Principles of good practice (COSHH, Schedule 2A), in order of priority (COSHH Regulations 2002, Regulation 7):
 - elimination of the harmful substance for a non-hazardous one (or at least substitution for a less hazardous one)
 - change the form of the substance, eg, paste, solution rather than dusty powder
 - modify the process so that it emits less of the hazardous substance (eg, painting vs spraying)
 - engineering controls (detail of extraction systems covered in element B4)
 - minimise the numbers of workers exposed
 - provide PPE.
- Additional control measures for carcinogens and mutagens:
 - total enclosure
 - prohibition of eating and drinking in contaminated areas
 - designation and cleaning of contaminated areas and use of suitable warning signs
 - closed and labelled containers.

B2.3 Asbestos and lead

- Distinctions between licensed and non-licensed asbestos work
- Additional control measures for asbestos (with reference to Asbestos Essentials and Control of Asbestos Regulations 2006)
- Additional control measures for working with lead (with reference to the Control of Lead at Work Regulations 2002).

Relevant statutory provisions

Control of Substances Hazardous to Health Regulations 2002 (as amended)

Control of Asbestos Regulations 2006

Control of Lead at Work Regulations 2002

Tutor references

COSHH Essentials www.coshh-essentials.org.uk

Asbestos Essentials, HSG210, ISBN 978-0-7176-6263-0

Work with Materials Containing Asbestos. Control of Asbestos Regulations 2006 Approved Code of Practice and Guidance

Control of Lead at Work Regulations 2002. Approved code of practice and guidance, L132, ISBN 9780717625659

Recommended tuition time not less than 5 hours

Element B3: Hazardous substances and other chemicals – engineering controls and personal protective equipment

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- B3.1 Explain local exhaust ventilation and procedures to ensure effective ventilation
- B3.2 Explain the various types of personal protective equipment (PPE) available for use with hazardous substances and other chemicals, their effectiveness, and the relevant specifications and standards to be met.

Content

B3.1 Ventilation

- Local exhaust ventilation (LEV) components and factors that determine effectiveness
- Dilution ventilation
- Visual, qualitative inspection of performance of engineering controls eg condition of suction inlet, dust deposits, use of smoke tubes and dust lamps (Tyndall beam)
- Measurements for assessing performance of local exhaust ventilation: methods and equipment for measuring capture velocities, face velocities, transport velocities and static pressures
- The statutory requirements for thorough examination and test
- Emissions to atmosphere after installing LEV systems
- The purpose of air cleaning devices.

B3.2 Personal protective equipment

- The requirements of the Personal Protective Equipment at Work Regulations 1992 in relation to hazardous substances and other chemicals
- The general factors affecting the choice and effectiveness of personal protective equipment (respiratory, eye, skin): type of protection required; level of protection required; compatibility; individual issues (e.g. spectacles, beards); wearer acceptability/comfort; fit; training)
- Respiratory protective equipment (RPE):
 - types of respirators and breathing apparatus and their applications and limitations
 - selection/suitability of RPE:
 - significance of assigned protection factors; overview of the use of HSE's RPE selector tool (Ref HSG53) to aid selection; face fit testing
 - storage and maintenance of RPE.
- Skin and eye protection: selection/suitability (eg, chemical compatibility), use, limitations, relevant specifications and performance standards.

Relevant statutory provisions

Control of Substances Hazardous to Health Regulations 2002 (as amended)

Control of Asbestos Regulations 2006

Control of Lead at Work Regulations 2002

Personal Protective Equipment Regulations 1992

Tutor references

Controlling airborne contaminants at work, a guide to local exhaust ventilation (LEV), maintenance, examination and testing. HSG258 ISBN 978 0 7176 6298 2

Clearing the air, A simple guide to buying and using local exhaust ventilation (LEV) HSE Books, ISBN 978 0 7176 6301 9

Recommended tuition time not less than 5 hours

Element B4: Monitoring and measuring

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- B4.1 Explain workplace exposure limits (WELs), the means by which they are established, and their application to the workplace
- B4.2 Outline the strategies, methods, and equipment for the sampling and measurement of airborne contaminants
- B4.3 Outline the principles of biological monitoring.

Content

B4.1 Workplace exposure limits (WELs)

- Concept of exposure standards
- The meaning of workplace exposure limits (WELs)
- How WELs are established: the work of the Advisory Committee on Toxic Substances (ACTS) and other sub-committees; criteria used
- The status and use of EH40
- The significance in occupational health and hygiene practice of short-term and long-term exposure limits (STEL, LTEL) and time-weighted average (TWA) values.
- Occupational exposure limits (OELs) for lead
- Blood-lead concentration and urinary-lead concentration action levels and suspension levels
- Control limits for working with asbestos.

B4.2 Strategies, methods and equipment for the sampling and measurement of airborne contaminants

- The role of the occupational hygienist; competence of hygienist
- Interpreting a hygienist's report, ensuring the strategy and methods are suitable and that results are valid, reliable, representative and correctly evaluated relative to any exposure standards
- Monitoring strategy (ref HSG173):
 - initial appraisal
 - basic survey
 - detailed survey
 - reappraisal

- routine monitoring and factors that determine the necessity and frequency (including where this is mandatory – COSHH Regulation 10)
- the importance of use of standard methods (MDHS series).
- General methods for sampling and gravimetric analysis of respirable and inhalable dust
- Sampling equipment for solid particulates (dusts, fibres): sampling head (protected, cyclone, cowl) and pump; method of use
- Measurement principles; dusts (gravimetric, physical and chemical analysis), fibres (microscopy)
- Sampling equipment for vapours; active devices (eg, liquid or solid sorbents and pumps); passive devices
- Measurement principles (chemical and physical analysis examples spectroscopy and chromatography)
- Calculation of 8 hour equivalent TWA exposures from gathered data (eg, sample mass, pump flow rate and flow time); comparison with LTEL and evaluation of significance in terms of further action needed
- Direct reading instruments (give immediate or near immediate reading); advantages and disadvantages; stain tube (colour metric) detectors.

B4.3 Biological monitoring

- Biological monitoring (a form of health surveillance) personal sampling/monitoring, as opposed to approximate airborne monitoring:
 - the basic principles (with workplace examples)
 - circumstances where it is especially applicable and the relative advantages and disadvantages
 - the role of biological monitoring guidance values (in EH40)
 - statutory biological limits (eg Control of Lead at Work Regulations, Regulation 10)
 - medical surveillance in relation to lead.

Relevant statutory provisions

Control of Substances Hazardous to Health Regulations 2002 (as amended)

Control of Asbestos Regulations 2006

Control of Lead at Work Regulations 2002

Tutor references

Exposure measurement: Air sampling, G409 of COSHH-ESSENTIALS

MDHS 14/3. General methods for sampling and gravimetric analysis of respirable and inhalable dust. ISBN 07176 1749 1

Recommended tuition time not less than 6 hours

Element B5: Biological agents

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

B5.1 Explain the types and properties of biological agents found at work

B5.2 Explain the assessment and control of risk from exposure to biological agents at work.

Content

B5.1 Types and properties of biological agents

- Meaning of 'biological agent'.
- Types of biological agent (fungi, bacteria, viruses) and sources (human, animal and environmental); with examples in each case.
- Special properties of biological agents (rapid mutation, incubation period, infectious, rapid multiplication).

B5.2 Assessment and control of risk

- Purpose of the Approved List of Biological Agents.
- Reportable diseases caused by biological agents (eg needle-stick injuries).
- Factors to take into account in risk assessment:
 - hazard category, (Groups 1, 2, 3 and 4 of COSHH Schedule 3) form
 - activities and people at risk
 - likelihood and nature of resultant disease
 - modes of transmission with examples.
- Intentional work vs. opportunistic infection.
- Selected diseases caused by biological agents, together with occupational contexts, occurrence, symptoms, treatment and control:
 - cryptosporidiosis
 - farmer's lung (and other diseases of this type – psittacosis)
 - hepatitis
 - HIV
 - legionellosis
 - leptospirosis
 - E. coli
 - zoonoses
 - MRSA
 - Cdiff
 - Emerging health issues, eg, norovirus, pandemic flu.

- General hierarchy of control:
 - eradication
 - reduced virulence
 - change of work method to minimise or suppress generation of aerosols
 - isolation and segregation
 - containment approach (Schedule 3 COSHH)
 - control for specific examples
 - sharps control
 - immunisation
 - decontamination and disinfection
 - effluent and waste collection
 - storage and disposal (controlled)
 - personal hygiene measures
 - personal protective equipment
 - biohazard signs
 - baseline testing and health surveillance.

Relevant statutory provisions

Control of Substances Hazardous to Health Regulations 2002 (as amended) Schedule 3,
Additional provisions relating to work with biological agents

The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995

Tutor references

Advisory Committee on Dangerous Pathogens, The Approved List of biological agents
(available as an online publication only on the HSE website at
<http://www.hse.gov.uk/pubns/misc208.pdf>.)

Recommended tuition time not less than 7 hours

Element B6: Physical agents 1 – noise and vibration

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- B6.1 Explain the basic physical concepts relevant to noise
- B6.2 Explain the effects of noise on the individual and the use of audiometry
- B6.3 Explain the measurement and assessment of noise exposure
- B6.4 Explain the principles of controlling noise and noise exposure
- B6.5 Explain the basic physical concepts relevant to vibration
- B6.6 Explain the effects of vibration on the individual
- B6.7 Explain the measurement and assessment of vibration exposure
- B6.8 Explain the principles of controlling vibration and vibration exposure.

Content

B6.1 Basic physical concepts relevant to noise

- The meaning of noise under the Control of Noise at Work Regulations 2005, with workplace examples
- The basic concepts of sound:
 - wavelength,
 - amplitude
 - frequency
 - intensity
 - pitch
 - the decibel (dB)
 - A-weighting 'dB(A)' and C weighting 'dB(C)', in relation to occupational noise exposure.
- The significance of logarithmic scales in relation to dB and concepts of addition of combined sounds (equal and unequal); concept of noise dose.

B6.2 Effects of noise on the individual

- The physiology of the ear in relation to the mechanism of hearing
- The physical and psychological effects on the individual; types of hearing loss with reference to their significance in the workplace, the acute and chronic physiological effects of exposure to high noise levels
- Use of audiometry to measure hearing and hearing loss; method, interpretation and use of results (interpretation of audiograms), advantages and disadvantages of audiometry programmes

- The legal requirements for audiometry as required by the Control of Noise at Work Regulations 2005 and Controlling Noise at Work, Guidance on Regulations, L108
- Civil law implications of audiometry.

B6.3 Measurement and assessment of noise exposure

- Instrumentation used for the measurement of noise:
 - types
 - methodology
 - calibration.
- The practical use of instrumentation to determine:
 - LA_{eq} and LEP,d
 - frequency analysis
 - background noise.
- The methodology of undertaking workplace noise surveys and personal noise exposure assessments:
 - planning (who, how, where, how often)
 - choice of instrumentation
 - measurements to be taken
 - interpretation and evaluation of results
 - use of noise calculators to determine mixed exposures
 - comparison with legal limits.

B6.4 Controlling noise and noise exposure

- Legal requirements and duties to manage exposure to noise as required by Control of Noise at Work Regulations 2005
- Lower and upper exposure action values, exposure limit values
- The hierarchy of noise control:
 - eliminate at source or control so far as is reasonably practicable at source (relocation, re-design, maintenance)
 - control along transmission path (eg isolation, barriers, enclosures)
 - control exposure at the receiver (enclosures, acoustic havens, hearing protection zones, and PPE, limiting exposure time, surveillance (audiometry).
- Techniques to control noise generation, transmission and exposure:
 - transmission
 - reflection
 - absorption
 - damping
 - diffusion
 - sound reduction indices
 - sound absorption coefficients.
- The selection, maintenance and use of appropriate hearing protection
 - use of octave band analysis
 - SNR (single number rating) and HML (high, medium, low) methods
 - problems of over-protection.

B6.5 Basic physical concepts relevant to vibration

- Vibration as defined in the Control of Vibration at Work Regulations 2005
- The basic concepts of displacement, velocity, amplitude, frequency and acceleration for oscillating particles in relation to:
 - occupational vibration exposure
 - comfort levels
 - the concept of vibration dose.

B6.6 Effects of vibration on the individual

- The physiological and ill-health effects of exposure to vibration, the difference between exposure to whole body vibration and hand-arm vibration, use of the Stockholm scale, aggravating factors (eg low temperatures, smoking)
- Groups of workers at risk from exposure to whole body vibration (WBV) and hand arm vibration (HAV).

B6.7 Measurement and assessment of vibration exposure

- The measurement of vibration:
 - instrumentation (the accelerometer)
 - units
 - use of manufacturers' data to estimate employee's exposure to vibration
 - making workplace measurements for both WBV and HAV exposure.
- Exposure standards for vibration with reference to legal limit and action values
- HSE Vibration calculator and its use to determine simple and mixed exposure.

B6.8 Controlling vibration and vibration exposure

Practical control measures to prevent or minimise exposure to both WBV and HAV:

- automation
- change of work method
- improved/alternative equipment
- purchasing policy
- maintenance
- job rotation
- instruction/training
- health surveillance
- PPE.

Relevant statutory provisions

Control of Noise at Work Regulations 2005

Control of Vibration at Work Regulations 2005

Personal Protective Equipment at Work Regulations 1992

Tutor references

Controlling Noise at Work, ACOP, L108

Control the risks from hand-arm vibration, Advice for employers on the Control of Vibration at Work, Regulations 2005, ISBN 978 0 7176 6117 6

Whole-body vibration, The Control of Vibration at Work Regulations 2005 Guidance on Regulations L141, ISBN: 0 7176 6126 1

Vibration Solutions: Practical ways to reduce the risk of hand-arm vibration injury, HSG170, ISBN 0 7176 0954 5

HSE <http://www.hse.gov.uk/noise/calculator.htm>

Recommended tuition time not less than 10 hours

Element B7: Physical agents 2 – radiation

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- B7.1 Outline the nature of the different types of ionising and non-ionising radiation
- B7.2 Explain the effects of exposure to non-ionising radiation, its measurement and control
- B7.3 Explain the effects of exposure to ionising radiation, its measurement and control
- B7.4 Explain the different sources of lasers found in the workplace, the classification of lasers and the control measures.

Content

B7.1 The nature and different types of ionising and non-ionising radiation

- The electromagnetic spectrum (wavelength, energy, frequency):
 - the differences between ionising and non-ionising radiation
 - the types of ionising radiation (alpha, beta, gamma, x radiation, neutrons) , origins and sources and non-ionising radiation (UV, IR, microwave and radio)
 - particulate and non-particulate types of ionising radiation.
- Role of the International Commission for Radiological Protection, the Health Protection Agency/Health Protection Scotland and the Environment Agency/Scottish Environment Protection Agency.

B7.2 Non-ionising radiation

- Sources of non-ionising radiation both generated in workplaces (eg leisure, manufacturing, healthcare, research, telecommunications etc) and naturally occurring (eg outdoor work)
- Exposure routes for non-ionising radiation. The effects of exposure to each type of non-ionising radiation (UV, IR, microwave and radio), both acute and chronic
- Units and methods of measurement, power density, proposed exposure limit values
- Practical control measures to prevent or minimise exposure to non-ionising radiation both generated in workplaces and naturally occurring including:
 - design
 - siting
 - direction control
 - reduction of stray fields
 - screening
 - enclosures

- distance
 - safe systems of work
 - instructions
 - training
 - personal protective equipment.
- Legal requirements to manage exposure to non-ionising radiation as required by existing and proposed legislation.

B7.3 Ionising radiation

- Sources of ionising radiation, both generated in workplaces (eg, manufacturing, healthcare, research, power generation) and naturally occurring (eg, radon)
- Routes of exposure for ionising radiation with reference to both external and internal (inhalation, ingestion, injection absorption) radiation exposure
- Effects of exposure to each type of radiation (alpha, beta, gamma, x radiation, neutrons) both acute and chronic, somatic, genetic, non-stochastic and stochastic
- Units of radioactivity, radiation dose and dose equivalent, dose response and dose effect, irradiation
- Methods of measuring ionising radiation, ionisation chambers (Geiger-Muller tube), scintillation detectors, with reference to how these might be used in the workplace
- Use of film badges, thermo-luminescent dosimeters, approved dosimetry services
- Practical measures to prevent or minimise exposure to:
 - external radiation (shielding, distance, time)
 - internal radiation (prevention of inhalation, ingestion, injection, absorption)
- Legal requirements to manage (non-medical) exposure to ionising radiation as required by Ionising Radiation Regulations 1999
- Duties include: provide safety devices, warning signals, handling tools etc, perform leakage testing of radioactive sources, provide and test protective equipment and clothing, monitor radiation and contamination levels, have radiation monitors regularly tested, store radioactive substances safely, design, construct and maintain buildings, fittings and equipment so as to minimise contamination, to notify HSE of certain occurrences, provide appropriate training, supervision and written instruction, draw up contingency arrangements for dealing with possible accidents
- Radiological exposure limits (as specified in Ionising Radiation Regulations) classified person.
- ALARP principle. Radon levels and ongoing measurement
- The role, competency and training of Radiation Protection Advisers and Radiation Protection Supervisors.

B7.4 Lasers

- Typical laser sources in workplaces (eg, leisure, entertainment, retail, manufacturing, healthcare, research, etc)
- Exposure routes for lasers
- Hazard classifications of lasers (IEC/EN 60825-1), exposure limits

- The effects of exposure to each class of laser
- Practical control measures to prevent or minimise exposure to lasers used in workplaces including design, siting, direction control, reduction of stray beams, screening, enclosures, distance, safe system of work/instructions, training, PPE
- The legal requirements to manage exposure to lasers as required by existing and proposed legislation
- Role, competency and training for a “Laser Protection Adviser” (voluntary scheme).

Relevant statutory provisions

Ionising Radiations Regulations 1999

Ionising Radiations (Medical Exposure) Regulations) 2000

Building Regulations (England and Wales) 2000

Non-ionising radiation - The Electro Magnetic Fields (EMF) Directive (or equivalent regulations)

Physical Agents (Artificial Optical Radiation) Directive (2006/25/EC) (or equivalent regulations)

Health and Safety at Work etc, Act 1974

Management of Health and Safety at Work Regulations 1999 (as amended)

Workplace (Health, Safety and Welfare) Regulations 1992

Tutor references

Working with ionising Radiation Approved Code of Practice (ACOP) and guidance in support of IRR99. ISBN 978 0 7176 1746 3 reference L121 HSE Books

HSE's Central Index of Dose Information (CIDI).

BRE Report, BR293; Radon in the workplace ISBN 1 86081 040 3 BRE Bookshops

Radon and Public Health RCE 11 The Independent Advisory Group on Ionising Radiation,

Publication date: June 2009, ISBN: 978-0-85951-644-0

Health Protection Agency web-site – Laser Safety Management

http://www.hpa.nhs.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1197021719447?p=1158934607766#5

Recommended tuition time not less than 9 hours

Element B8: Psychosocial agents

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- B8.1 Explain the scope, effects and causes of work-related stress
- B8.2 Explain the identification and control of workplace stress with reference to legal duties and other standards
- B8.3 Explain the scope, effects and causes of work-related violence/aggression
- B8.4 Explain the identification and control of work-related violence/aggression with reference to legal duties.

Content

B8.1 Scope, effects and causes of work-related stress

- The meaning of work-related stress and post-traumatic stress disorder
- The prevalence of work-related stress with reference to reportable and self reported sources
- Physical and psychological effects of work-related stress
- Causes of work-related stress relating to organisation, job and individual:
 - organisation of work:- working hours, long hours, shift work, unpredictable hours, changes in working hours
 - workplace culture:- communication, organisational structure, resources, support
 - working environment:- space, noise, temperature, lighting, etc
 - job content:- work load, time pressures, boredom, etc
 - job role:- clarity, conflict of interests, lack of control, etc
 - relationships:- bullying and harassment, verbal/physical abuse
 - home-work interface:- commuting, childcare issues, relocation, etc.

B8.2 Identification and control, legal duties and standards

- Identification and assessment of work-related stress and post-traumatic stress disorders at individual and organisational level (eg, discussions, absence data, interviews, surveys, questionnaires, etc)
- The HSE stress management standards and their role in assessing and managing work related stress (demand, control, support, relationships, role, change)
- Practical control measures to reduce and manage work-related stress, based on the HSE management standards (including counselling and return to work policies)

- Legal requirements for employers to manage work related stress as part of criminal and civil law with reference to relevant statutory provisions and case law examples, Sutherland v Hatton and others [2002]; Walker v Northumberland County Council [1995]; Barber v Somerset County Council [2004]; Intel Corporation (UK) Limited v Daw [2007].

B8.3 Scope and effects of work-related violence/aggression

- Meaning of work-related violence/aggression (physical/verbal, actual harm and threats)
- Physical and psychological effects of violence and aggression
- Prevalence/extent of work-related violence/aggression and consequences with reference to reportable and self-reported sources (eg, British crime survey, RIDDOR)
- Identification and assessment of risks of work-related violence/aggression (eg, use of staff surveys, incident reporting and risk assessment)
- Factors likely to increase the risk of work-related violence, eg, people working with public, caring/teaching professions, working with psychiatric clients or alcohol/drug impaired people, working alone, home visiting, handling money/valuables, inspection and enforcement duties, retail and licensed trade.

B8.4 Identification and control of workplace violence/aggression

- Identification of practical control measures to reduce and manage work-related violence/aggression including using physical, organisational and behavioural controls:
 - cash free systems, layout of public areas and design of fixtures and fittings
 - use of cameras, protective screens, and security-coded doors
 - communication systems, passing on information on risks from individual clients (violent marker flags), recording of staff whereabouts and recognition when staff are overdue, use of mobile communications equipment phones, radios, GPS
 - staff training: recognition of situations where violence could result, interpersonal skills to defuse aggression, use of language and body language; guidance to staff on dealing with an incident; support for staff post-incident including training in counselling for managers.
- Legal requirements for employers to manage work-related violence/aggression as part of criminal and civil law with reference to relevant statutory provisions and case law. Legal constraints regarding 'reasonable force'.

NB: Marks will be awarded for other **relevant** case law quoted in examinations.

Relevant statutory provisions

Health and Safety at Work etc. Act 1974 Section 2, 3 & 4

Management of Health and Safety at Work Regulations 1999 (as amended)

Working Time Regulations 1998

Reporting of Injuries, Diseases and Dangerous Occurrence Regulations 1995

Public Order Act 1986

Criminal Law Act 1967, Section 3, (reasonable force)

Data Protection Act 1998

Employment Rights Act 1996.

Case law

Sutherland v Hatton and others [2002] EWCA Civ76; Walker v Northumberland County Council [1995] IRLR 35

Barber v Somerset County Council [2004] UKHL 13

Intel Corporation (UK) Limited v Daw [2007] EWCA Civ 70.

Recommended tuition time not less than 5 hours

Element B9: Musculoskeletal risks and controls

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- B9.1 Outline types, causes and relevant workplace examples of injuries and ill-health conditions associated with repetitive physical activities, manual handling and poor posture
- B9.2 Explain the assessment and control of risks from repetitive activities, manual handling and poor posture.

Content

B9.1 Types, causes and examples of musculoskeletal hazards

- Basic understanding of the human musculoskeletal system including, bones, tendons, ligaments, nerves and muscles
- Ergonomic principles as applied to the control of musculoskeletal risks
- Types of injury and ill-health conditions resulting from repetitive physical activities, manual handling and poor posture, including; WRULDs, musculoskeletal injury and discomfort, back pain, eye and eyesight effects, fatigue, stress, sprains/strains, fractures, lacerations
- Examples of jobs and workplace situations that give rise to risks of these injuries and ill-health conditions, eg production/assembly lines, working in restricted work spaces, use of DSE, manual handling of objects and people.

B9.2 Assessing risks from repetitive physical activities, manual handling and poor posture

- Legal requirements to manage risks associated with repetitive physical activities, manual handling and poor posture, with specific reference to duties under Management of Health and Safety at Work Regulations 1999, Manual Handling Operations Regulations 1992, Health and Safety (Display Screen Equipment) Regulations 1993 (as amended) and Workplace (Health, Safety and Welfare) Regulations 1992
- Consideration of: task, load, force, working environment, equipment, individual capability when assessing risks associated with repetitive physical activities, manual handling and poor posture
- Methods of assessing the risks associated with jobs/tasks involving repetitive physical activities, manual handling and poor posture
- Use of assessment tools: HSE Manual Handling Assessment Tool (MAC), HSE Art Tool (assessment tool for repetitive tasks of the upper limbs), NIOSH Manual Material Handling (MMH) Checklist, Rapid Upper Limb Assessment (RULA), Quick Exposure Check (QEC)

- Practical control measures to avoid or minimise the risk associated with repetitive physical activities, manual handling and poor posture including: elimination, automation, alternative work methods/job design, ergonomic design of tools/equipment/workstations and workplaces, job rotation, work routine, eye and eyesight testing, training and information, efficient movement principles, personal considerations.

Relevant statutory provisions

Health and Safety (Display Screen Equipment) Regulations 1992

Manual Handling Operations Regulations 1992

Workplace (Health, Safety, Welfare) Regulations 1992

Management of Health and Safety at Work Regulations 1999 (as amended)

Health and Safety at Work etc. Act 1974

Recommended tuition time not less than 4 hours

Element B10: Work environment risks and controls

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- B10.1 Explain the need for, and factors involved in, the provision and maintenance of thermal comfort in the work environment
- B10.2 Explain the need for suitable and sufficient lighting in the workplace, units of measurement of light and the assessment of lighting levels in the workplace
- B10.3 Explain the need for welfare facilities and arrangements in fixed and temporary workplaces
- B10.4 Explain the requirements and provision for first aid in the workplace.

Content

B10.1 The need for, and factors involved in, the provision and maintenance of thermal comfort in the work environment

- Legal requirements for managing thermal comfort and providing a 'reasonable' temperature for inside workplaces
- The meaning of thermal comfort
- The effects of working in high and low temperatures and humidity
- Typical work situations likely to lead to thermal discomfort
- The environmental parameters affecting thermal comfort (air temperature, radiant temperature, relative humidity, air velocity) and how to measure them (thermometers; dry bulb, wet bulb, globe, kata, anemometers, psychrometers, integrated electronic instruments including heat stress monitors)
- Other parameters affecting thermal comfort: metabolic rate, clothing, sweat rate, duration of exposure
- Heat balance equation $M = K + C + R + E$
- Measuring thermal comfort using predicted mean vote (PMV) and percentage people dissatisfied (PPD) index and use of BS EN ISO 7730 and BS EN ISO 10551
- The assessment of heat stress, role of heat indices, difference between empirical, direct and rational indices: (eg effective temperature (ET), corrected effective temperature (CET), heat stress index (HSI), predicted 4-hour sweat rate (P4SR), wind chill index (WCI))
- Use of the heat stress index WBGT (as per BS EN 27243), equation used to calculate units, metabolic rate class, comparison to reference values, conclusions on heat stress risk, acclimatisation

- Practical control measures to minimise the risks when working in extreme thermal environment:
 - control heat source
 - control other environmental parameters
 - separation
 - workplace design
 - job design clothing/PPE
 - health surveillance
 - training.

B10.2 Suitable and sufficient lighting in the workplace, units of measurement of light and the assessment of lighting levels in the workplace

- The necessity for lighting in workplaces
- 'Suitable and sufficient lighting', natural and artificial lighting
- The impact of lighting levels on safety issues – incorrect perception, failure to perceive, stroboscopic effects, colour assessment, effect on attitudes
- Effects of brightness contrast – disabling and discomfort glare, tissue damage from light exposure, visual fatigue
- Instrumentation, units and measurement of light, assessment of lighting levels and standards.

B10.3 Welfare facilities and arrangements in fixed and temporary workplaces

- Legal requirements for welfare facilities and arrangements in workplaces
- Provision of toilet, washing and changing facilities
- Storage of clothing
- Facilities for eating, rest rooms
- Facilities for pregnant women and nursing mothers, together with the practical arrangements
- Provision of facilities for smokers, company vehicles, care homes and flats where residents smoke
- The need to take account of disabled persons.

B10.4 Requirements and provision for first aid in the workplace

- Legal requirements for first aid in the workplace
- The basis of provision (eg, numbers of employees, workplace risks, proximity of emergency services).

Relevant statutory provisions

Health and Safety at Work etc Act 1974

Management of Health and Safety at Work Regulations 1999 (as amended)

Workplace (Health, Safety and Welfare) Regulations 1992

Health and Safety (First Aid) Regulations 1981

The Smoke-free (Premises and Enforcement) Regulations 2006

The Smoke-free Premises etc. (Wales) Regulations 2007

Prohibition of Smoking in Certain Premises (Scotland) Regulations 2006

Tutor references

BS EN ISO 7730, Moderate thermal environments, ISBN 0 580 47207 0

Recommended tuition time not less than 5 hours

Element B11: Managing occupational health

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

B11.1 Outline the nature of occupational health

B11.2 Outline the principles and benefits of vocational rehabilitation including the role of outside support agencies

B11.3 Outline the management of occupational health (including the practical and legal aspects).

Content

B11.1 Nature of occupational health

- Categories of occupational health hazard – chemical, physical, biological, psycho-social, ergonomic
- The prevalence of work-related sickness and ill-health with reference to reportable and self-reported sources
- Internal and external sources of information on occupational ill-health
- The links between occupational health and general/public health, with reference to current government strategy for managing health in relation to work including arrangements to deal with epidemics.

B11.2 Nature of occupational health

- Meaning of vocational rehabilitation
- Benefits of vocational rehabilitation within the context of the employee and the employer
- The basic principles of the bio-psychosocial model and how it relates to the health of individuals
- The role that overcoming any barriers to ensure that rehabilitation of the individual is effective
- Role of agencies that can support the employers and employees, eg, primary care (condition management), JobCentre+, Access to Work, etc

B11.3 Managing occupational health

- The concept of monitoring health
- The meaning of occupational health (with reference to the definition used by the International Labour Organisation)
- The role, function and benefits of occupational health services

- The make-up and functions of a typical occupational health service: occupational health physician, occupational health nurse, occupational health technician
- Typical services offered by an occupational health service:
 - health promotion, eg, advice on work related health, lifestyle (diet, exercise, smoking etc)
 - health assessment, eg, fitness for work, pre-placement/employment, return to work, job-related medical screening, pregnant workers
 - advice to management, eg, input to risk assessments, no-smoking policy, absence management etc
 - treatment services, eg, first aid, counselling, physiotherapy, other rehabilitation services
 - medical and health surveillance.
- Occupational competence within occupational health
- Distinction between general health assessment and health surveillance
- The legal requirements for health surveillance, with reference to Control of Substances Hazardous to Health Regulations, Control of Noise at Work Regulations, Control of Vibration at Work Regulations, and Display Screen Equipment Regulations
- The legal requirements for medical surveillance with reference to Control of Substances Hazardous to Health Regulations, Control of Lead at Work Regulations, Control of Asbestos Regulations and Ionising Radiation Regulations
- Liaison with other disciplines in the assessment and management of fitness for work with specific reference to; existing health problems, fitness to work standards, discrimination, influence of drugs and alcohol (prescription and illegal drugs), including testing on the grounds of health (or disability)
- The legal requirements for keeping health records and medical records including issues of confidentiality, sharing of information with the individual and others
- The collection and use of sickness absence and ill-health data to develop occupational policy and targets/strategy.

Relevant statutory provisions

The Management of Health and Safety at Work Regulations 1999, Regulation 6
Control of Substances Hazardous to Health Regulations 2002 (as amended), Regulation 11 and schedule 6
Smoke-free (Premises and Enforcement) Regulations 2006
Prohibition of Smoking in Certain Premises (Scotland) Regulations 2006
The Smoke Free Premises etc. (Wales) Regulations 2007
Control of Lead at Work Regulations 2002, Regulation 10
Control of Noise at Work Regulations 2005, Regulation 9
Control of Vibration at Work Regulations 2005, Regulation 7
Control of Asbestos Regulations 2006, Regulation 22
Ionising Radiation Regulations 1999, Regulation 24

Tutor references

Occupational Health Advisory Committee report and recommendations on improving access to occupational health support, HSE Web-site source;
<http://www.hse.gov.uk/aboutus/meetings/iacs/ohac/access.htm>
Chartered Institute of Personnel and Development: Absence Guidance
<http://www.cipd.co.uk/subjects/hrpract/absence/absncman.htm?IsSrchRes=1>
Chartered Institute of Personnel and Development: Absence management Tools 1-4
<http://www.cipd.co.uk/subjects/hrpract/absence/absmantool.htm>
Control of noise at work, Guidance for employers on the Control of Noise at Work Regulations 2005 INDG 362, ISBN 978 0 7176 6165 7
DWP Disability Handbook and guidance.
Institution of Occupational Safety and Health: A Healthy Return - A Good Practice Guide to Rehabilitating People at Work
The Guides Newsletter. Chicago, American Medical Association, 2008; May/June: 1-13

Recommended tuition time not less than 8 hours

4.3 Unit C: Workplace and work equipment safety

Overall Learning Outcome

On completion of this unit, candidates should be able to demonstrate understanding of the domain knowledge covered through:

1. The application of knowledge to familiar and unfamiliar situations; and
2. The critical analysis and evaluation of information presented in both quantitative and qualitative forms.

In addition each element has specific learning outcomes.

Element C1: General workplace issues

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- C1.1 Explain the need for, and factors involved in, the provision and maintenance of a safe working environment, with specific reference to access and egress, pedestrians, and slips, trips and falls
- C1.2 Explain how safety signs are used in the workplace
- C1.3 Explain the assessment of risk and safe working practices associated with work in confined spaces
- C1.4 Outline the main issues associated with maintaining structural safety of workplaces
- C1.5 Explain the hazards, risks, and controls when working at heights
- C1.6 Explain the hazards, risks and controls for lone working.

Content

C1.1 Safe working environment

- Practical considerations in the provision and maintenance of safe places of work and safe means of access and egress

- The design of surfaces to reduce slipping
- Wet Coefficient of Friction (CoF), slip resistant testing of footwear and surfaces:
 - different CoF between one surface and another
 - effects of contamination on surfaces in terms of CoF
 - methods for cleaning floors and the appropriate footwear to wear whilst cleaning
 - importance of good housekeeping.
- Workplace (Health, Safety and Welfare) Regulations 1992.

C1.2 Safety signs

- Common safety signs and their categorisation
- Use, location and compliance issues
- Health and Safety (Safety Signs and Signals) Regulations 1996, Regulations 2, 3, 4 and 5.

C1.3 Confined spaces

- Conditions that constitute a confined space with reference to the Confined Spaces Regulations 2007
- Examples of where confined space entry may occur in the workplace: eg pits in garages, vehicle production tracks, trunking ducts, watercourses
- Factors to be considered when assessing risk: need for safe access; provision and maintenance of safe atmospheres; the task, materials and equipment; persons at risk; reliability of safeguards
- Factors to be considered in designing safe working practices: operating procedures and emergency arrangements; and training for work in confined spaces
- Flammable atmospheres; how they arise and where they are found. Control measures for entering flammable atmospheres, including purging to keep flammable atmospheres below Lower Explosion Limits (LEL).

C1.4 Structural safety of workplaces

- Causes of damage to the structure of buildings: adverse weather conditions; overloading of structures; hot and corrosive atmospheres; vibration; alteration to structural members; subsidence; deterioration of building materials; excavations; and unauthorised modifications to buildings
- Failure modes: possible causes of structural alterations such as cutting roof beams; puncturing holes through floors; removal of internal walls etc can lead to collapse.

C1.5 Working at height

- The main hazards and risks, alternatives, precautions and safe working procedures for working at height in general workplaces

- Hierarchy of control measures with reference to the Work at Height Regulations 2005:
 - avoid working at height
 - use an existing safe place of work
 - provide work equipment to prevent falls (including MEWPS)
 - mitigate distance and consequences of a fall
 - instruction and training and/or other means.

C1.6 Lone working

- The main hazards and risks, alternatives, precautions and safe working procedures for lone working.
- Particular problems facing lone workers: medical conditions, training, supervision, emergency procedures, lifting objects that are too heavy for one person, more than one person needed to operate essential controls or transport.

Relevant statutory provisions

Confined Spaces Regulations 1997

Health and Safety (Safety Signs and Signals) Regulations 1996

Management of Health and Safety at Work Regulations 1999

Workplace (Health, Safety and Welfare) Regulations 1992

Work at Height Regulations 2005

Recommended tuition time not less than 7 hours

Element C2: Principles of fire and explosion

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- C2.1 Outline the properties of flammable and explosive materials and the mechanisms by which they ignite
- C2.2 Outline the behaviour of structural materials, buildings and building contents in a fire
- C2.3 Outline the main principles and practices of fire and explosion prevention and protection
- C2.4 Outline the contribution of typical mechanical and systems failures to major accidents.

Content

C2.1 Properties of flammable and explosive materials and the mechanisms by which they ignite

- Properties of solids, liquids and gases
- Meaning of: flash point, fire point, auto-ignition temperature, vapour density, relative density, limits of flammability, critical temperature, maximum explosion pressure, and rate of pressure rise; with examples of the importance of these properties in relation to the initiation and propagation of fire and explosion
- The fire triangle
- Ignition sources (eg naked flame, hot surfaces, arcing, sparking, smoking, electrostatic discharge)
- Mechanisms of explosions, mechanisms of fire-spread including:
 - how an explosion/fire occurs
 - the stages of combustion: induction, ignition, growth, steady state and decay
 - mechanisms of uncontrolled vapour cloud explosions, confined vapour cloud explosions.
- The effects of atomisation/particle size and oxygen content on the likelihood and severity of fire/explosion
- How failure of control measures coupled with the physico-chemical properties of flammable materials can bring about an explosion
- Oxidisation
- Confined vapour cloud explosions, unconfined vapour cloud explosions, boiling liquid expanding vapour explosions. Examples of actual incidents, causes and effects:
 - unconfined vapour cloud explosion (eg Buncefield, 2005; Flixborough, 1974)
 - boiling liquid expanding vapour explosion (BLEVE) (eg Mexico City, 1984)
 - confined vapour cloud explosion (eg Hickson and Welch, 1992).

- Control of vapour phase explosions; structural protection, plant design and process control, segregation and storage of materials, hazardous area zoning, inerting, explosion relief
- Control of amount of material, prevention of release, control of ignition sources, sensing of vapour between Lower Explosive Limit (LEL) and Upper Explosive Limit (UEL)
- Dust explosions:
 - examples of industries/plant with potential dust explosion hazards (eg, food industry, LEV)
 - mechanisms of dust explosions including the importance of combustible solid particle size, dispersal, explosive concentrations, ignition, energy, temperature and humidity
 - primary and secondary explosion.
- Examples of actual incidents, causes and effects (e.g. General Foods, Banbury, 1981; Imperial Sugar, Georgia USA, 2008) and the processes involved.

C2.2 Behaviour of structural materials, buildings and building contents in a fire

- The behaviour of building structures and materials in fire: fire properties of common building materials and structural elements (eg, steel, concrete, wood); level of fire resistance
- The behaviour of common building contents in fire (eg, paper-based, fabrics, plastics)
- Examples of actual incidents: charring of oak beams during the Windsor Castle fire, 1992; fuels involved in the Channel Tunnel fire, 2008; Buncefield, 2005; Windsor Tower fire (Madrid), 2005; Summit Tunnel fire, 1984.

C2.3 Fire and explosion prevention and protection

- Structural protection (eg, openings and voids, compartmentation)
- Key features of plant design and process control
- Segregation and storage of flammable, combustible and incompatible materials
- Hazardous area zoning, exclusion of ignition sources
- Inerting
- Methods of explosion relief: venting, explosion panels, bursting discs, suppression (eg, inerting).

C2.4 Major accidents

- The contribution of typical mechanical and systems failures to major accidents, eg, Flixborough, 1974; Piper Alpha, 1988; Grangemouth, 1987; Allied Colloids, 1992; Hickson and Welch, 1992; and Buncefield, 2005.

Relevant statutory provisions

Building Regulations Approved Document B

Dangerous Substances and Explosive Atmospheres Regulations 2002

Electricity at Work Regulations 1989

Recommended tuition time not less than 6 hours

Element C3: Workplace fire risk assessment

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- C3.1 Outline the main legal requirements for fire safety in the workplace
- C3.2 Explain the processes involved in the identification of hazards and the assessment of risk from fire
- C3.3 Describe common fire detection and alarm systems and procedures
- C3.4 Outline the factors to be considered when selecting fixed and portable fire-fighting equipment for the various types of fire
- C3.5 Outline the factors to be considered in the provision and maintenance of means of escape
- C3.6 Explain the purpose of, and essential requirements for, emergency evacuation procedures.

Content

C3.1 Legal requirements

- The regulatory powers of a fire authority with respect to fire safety
- Dual enforcement
- Requirements of the Regulatory Reform (Fire Safety) Order 2005 (or alternative related local Statutory Instrument eg Fire Safety (Scotland) Regulations 2006)
- Reference to the Buildings Regulations.

C3.2 Identification of hazards and the assessment of risk from fire

- Fire hazards and assessment of risk
- Five steps to fire risk assessment:
 - identify fire hazards; how could a fire start, what could burn (eg common flammable solids, liquids and gases)
 - identify people at risk; including those especially at risk
 - evaluate, remove, reduce (eg control of ignition, fuel and oxygen sources), and protect from risk
 - record, plan, inform, instruct and train
 - review.

C3.3 Fire detection and alarm systems and procedures

- Common fire detection and alarm systems and procedures:
 - factors in design and application of fire detection and alarm systems
 - principal components of alarm systems; detection and signalling
 - manual and automatic systems.

C3.4 Fixed and portable fire-fighting equipment

- Factors in design and application of fixed fire-fighting systems and equipment:
 - classification of fires
 - portable fire fighting equipment
 - extinguishing media and mode of action
 - siting, maintenance and training requirements
 - environment, including fire water runoff.

C3.5 Means of escape

- Factors to be considered in the provision and maintenance of a means of escape.
- General requirements for travel distances, stairs, passageways and doors, emergency lighting, exit and directional signs.

C3.6 Emergency evacuation procedures

- Purposes of and essential requirements for, evacuation procedures and drills, alarm evacuation and roll call
- Provision of Fire Wardens and their role
- Personal Emergency Evacuation Plans (PEEPs).

Relevant statutory provisions

The Regulatory Reform (Fire Safety) Order 2005
Fire Safety (Scotland) Regulations 2006
The Fire (Scotland) 2005 Act
The Health and Safety at Work etc Act 1974
Management of Health and Safety at Work Regulations 1999
Building Regulations 2000, Approved Document B
Health and Safety (Safety Signs and Signals) Regulations 1996
Regulatory Reform (Fire Safety) Order 2005
- A short guide to making your premises safe from fire, June 2006
Fire Safety Risk Assessment - Offices and Shops, June 2006
Fire Safety Risk Assessment – Factories and Warehouses, June 2006
Fire Safety Risk Assessment - Residential Care Premises, June 2006
Fire Safety Risk Assessment - Sleeping Accommodation, June 2006
Fire Safety Risk Assessment - Small and Medium Places of Assembly, June 2006
Fire Safety Risk Assessment - Large Places of Assembly, 5 June 2006
Fire Safety Risk Assessment - Educational Premises, 5 June 2006
Fire Safety Risk Assessment - Theatres, Cinemas and Similar Premises, 8 June 2006
Fire Safety Risk Assessment - Open Air Events and Venues, March 2007
Fire Safety Risk Assessment - Transport Premises and Facilities, February 2007
Fire Safety Risk Assessment - Healthcare premises, September 2006
Fire Safety Risk Assessment - Animal Premises and Stables, October 2007
PAS 79:2007, Fire Risk Assessment. Guidance and a Recommended Methodology

Recommended tuition time not less than 6 hours

Element C4: Storage, handling and processing of dangerous substances

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- C4.1 Outline the main physical and chemical characteristics of industrial chemical processes
- C4.2 Outline the main principles of the safe storage, handling and transport of dangerous substances
- C4.3 Outline the main principles of the design and use of electrical systems and equipment in adverse or hazardous environments
- C4.4 Explain the need for emergency planning, the typical organisational arrangements needed for emergencies and relevant regulatory requirements.

Content

C4.1 Industrial chemical processes

- Effects of temperature, pressure and catalysts on rates of chemical reactions
- Heat of reaction in terms of endothermic, exothermic and runaway reactions
- Examples of endothermic reaction (eg, photosynthesis; reacting ethanoic acid with sodium carbonate) example of exothermic reaction (eg, mixture of sodium and chlorine to produce salt)
- Methods of control of temperature and pressure.

C4.2 Storage, handling and transport of dangerous substances

- Dangerous substances and hazardous substances with reference to the definitions contained in appropriate legislation
- Hazards presented and assessment of risk
- Storage methods and quantities - bulk, intermediate, drum storage, specific locations. Storage of incompatible materials and their segregation requirements and access
- Leakage and spillage containment – bunding, filling and transfer and problems encountered during filling and transfer with examples (Albright and Wilson, Avonmouth, 1996)
- Storage and handling of dangerous substances:
 - flow through pipelines
 - principles in filling and emptying containers
 - principles in dispensing, spraying and disposal of flammable liquids
 - dangers of electricity in hazardous areas.

- Transport of dangerous substances:
 - key safety principles in loading and unloading of tankers and tank containers
 - labelling of vehicles and packaging of substances
 - driver training and the role of the Dangerous Goods Safety Adviser under the Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009.

C4.3 Hazardous environments

- Principles of: resistance to mechanical damage, protection against solid bodies, objects and dusts, protection against liquids and gases
- Wet environments – including corrosion and degradation of installation and damage to electrical systems
- Principles of selection of electrical equipment for use in flammable atmospheres
- Classification of hazardous areas, zoning
- Use of permits-to-work
- Principles of pressurisation and purging
- Intrinsically safe equipment, flameproof equipment, type 'N' equipment, type 'e' equipment.

C4.4 Emergency planning

- The need for emergency preparedness within an organisation; eg, personal injury, explosive device, fire, loss of containment with reference to duties under the Management of Health and Safety at Work Regulations 1999 and Control of Major Accident Hazards Regulations 1999
- Consequence minimisation via emergency procedures; eg, first-aid/medical, fire evacuation, spill containment
- The need for the development of emergency plans in order to reduce the impact on the organisation, including post-incident recovery. The role of external emergency services and local authorities in emergency planning and control
- The need to develop and prepare an emergency plan, including the content of both on-site and off-site plans for major emergency scenarios in order to meet regulatory requirements
- The need for on-going monitoring and maintenance of emergency plans.

Relevant statutory provisions

Notification of Installations Handling Hazardous Substances Regulations 1982 (as amended)

Dangerous Substances (Notification and Marking of Sites) Regulations 1990

The Chemicals (Hazard Information and Packaging for Supply) Regulations 2009

Health and Safety (Safety Signs and Signals) Regulations 1996

Dangerous Substances and Explosive Atmospheres Regulations 2002

Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009

Regulation for Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

Management of Health and Safety at Work Regulations 1999 – Regulations 8 and 9

Control of Major Accident Hazards Regulations 1999

European Agreement concerning the International Carriage of Dangerous Goods by Road 2009

Recommended tuition time not less than 7 hours

Element C5: Work equipment (general)

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- C5.1 Outline the criterion for the selection of suitable work equipment for particular tasks and processes to eliminate or reduce risks
- C5.2 Explain how risks to health and safety arising from the use of work equipment are controlled
- C5.3 Explain safe working procedures for the maintenance, inspection and testing of work equipment according to the risks posed
- C5.4 Explain the role of competence, training, information and supervision in the control of risks arising from the installation, operation, maintenance and use of work equipment.

Content

C5.1 Selection of suitable equipment

- Suitability of work equipment for the required task, process and environment
- Suitability of the design, construction and adaptation of work equipment
- Suitability of work equipment for its intended location of use
- The means by which all forms of energy used or produced and all substances used or produced can be supplied and/or removed in a safe manner
- Ergonomic, anthropometric and human reliability considerations in use of work equipment including: the layout and operation of controls and emergency controls; and reducing the need for access (automation, remote systems)
- The importance of size of openings; height of barriers; and distance from danger.

C5.2 Risk assessment and use

- The need for conducting risk assessments in the use of work equipment
- The risks associated with the use of work equipment arising from its initial integrity, the location where it will be used, and the purpose for which it will be used
- The risks associated with the use of work equipment arising from its: incorrect installation or re-installation; deterioration; or, of exceptional circumstances which could affect the safe operation of work equipment
- The risk control hierarchy relating to work equipment: eliminating the risks; taking 'hardware' (physical) measures (such as the provision of guards); taking appropriate 'software' measures (such as following safe systems of work and the provision of information, instruction and training)

C5.3 Maintenance, inspection and testing

- The hazards and precautions associated with the maintenance of work equipment
- The three maintenance management strategies of: planned preventive; condition based; and breakdown
- Factors to be considered in developing a planned maintenance programme for safety-critical components
- The statutory duties for the maintenance of work equipment, including hired work equipment
- The factors to be considered in determining inspection regimes having regard to the type of equipment; where it is used; and how it is used
- The need for functional testing of safety-related parts, including interlocks, protection devices, controls and emergency controls.

C5.4 Competence, training, information and supervision

- The difference between training and competence
- Circumstances when training is likely to be required including: induction; changes in work activities; introduction of new technology or new equipment; changes in systems of work; refresher training due to declining skills
- Groups of people having specific training needs including supervisors, young and vulnerable persons
- The relationship between competence, external and self-supervision
- The circumstances where there are specific training needs for certain hazardous types of work equipment (including chainsaws, woodworking machines, power presses, abrasive wheels, etc).

Relevant statutory provisions

Health and Safety at Work etc. Act 1974

Provision and Use of Work Equipment Regulations 1998

Recommended tuition time not less than 9 hours

Element C6: Work equipment (workplace machinery)

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- C6.1 Describe the principles of safety integration and the considerations required in a general workplace machinery risk assessment
- C6.2 Describe, with examples, the principal generic mechanical and non-mechanical hazards of general workplace machinery
- C6.3 Describe protective devices found on general workplace machinery
- C6.4 Explain the principles of control associated with the maintenance of general workplace machinery
- C6.5 Describe the requirements for information and warnings on general workplace machinery
- C6.6 Explain the key safety characteristics of general workplace machinery control systems
- C6.7 Explain the analysis, assessment and improvement of system failures and system reliability with the use of calculations.

Content

C6.1 Safety integration and machinery risk assessment

- The principles of safety integration from The Supply of Machinery (Safety) Regulations 2008:
 - machinery must be designed and constructed to be fit for purpose and to eliminate or reduce risks throughout the lifetime of the machinery including the phases of transport, assembly, dismantling, disabling and scrapping
 - the principles must be applied in order to eliminate or reduce risks as far as possible; take necessary protective measures where risk cannot be eliminated; and inform users of any residual risks
 - when designing and constructing machinery and when drafting the instructions: use and foreseeable misuse must be considered
 - take account of operator constraints due to necessary or foreseeable use of personal protective equipment
 - machinery must be supplied with all the essentials to enable it to be adjusted, maintained and used safely
- The factors to be considered when assessing risk: persons at risk, severity of possible injury, probability of injury, need for access, duration of exposure, reliability of safeguards, operating procedures and personnel

- Purpose of CE marking and the relevance of the CE mark; selection and integration of work equipment in the workplace
- Conformity assessments, the use of harmonised standards, the technical file and the declaration of conformity.

C6.2 Generic hazards

- Common machinery hazards in a range of general workplaces: drills (radial arm, pedestal), circular saws, guillotines, paper shredders, photocopiers, disc sanders, abrasive wheels, lathes, automatic doors and gates, mechanical and hydraulic presses, portable power tools, CNC machines, robotics
- The types of generic machinery hazards:
 - mechanical hazards: crushing, shearing, cutting/severing, entanglement, drawing-in/trapping, impact, stabbing/puncture/ejection, friction/abrasion, high pressure fluid injection
 - non-mechanical hazards: noise, vibration, electricity, high/low temperature, radiation, hazardous substances
- The typical causes of failures, with examples – excessive stress, abnormal external loading, metal fatigue, ductile failure, brittle fracture, buckling and corrosive failure (Brent Cross, 1964; Markham Colliery, 1973; Littlebrook D, 1978; Ramsgate Walkway Collapse, 1994)
- The principles of operation, advantages, disadvantages and application of non-destructive testing techniques, specifically dye penetrant, acoustic, ultrasonic, radiography (gamma and x-ray), eddy current, magnetic particle.

C6.3 Protective devices

- The main types of safeguarding devices: characteristics, key features, limitations and typical applications of fixed enclosed guards, fixed distance guards, interlocked guards, automatic guards, trip devices, adjustable/self-adjusting guards, two-hand controls, mechanical restraints, jigs and push-sticks.

C6.4 Maintenance

- The means by which machinery is safely set, cleaned and maintained including: safe systems of work; permits; isolation; procedures for working at unguarded machinery
- The means by which machines are isolated from all energy sources.

C6.5 Information and warnings

- The scope of information required for the safe use and operation of machinery, specifically: the conditions under which the machinery may be used; foreseeable abnormal situations and the action to be taken; and any conclusions to be drawn from experience in usage
- The means by which information and instructions regarding the operation and use of machinery must be readily comprehensible to those concerned.

C6.6 Machinery control systems

- The key safety characteristics of machinery control systems to include:
 - making allowance for the failures, faults and constraints to be expected in the planned circumstances of use; does not create any increased risk to health or safety; faults or damage to the control system or the loss of energy supply must not result in additional risk to health or safety; does not impede the operation of any stop/energy stop controls
 - controls for starting or making a significant change in operating conditions including any change in speed, pressure or other operating condition
 - stop controls readily accessible and leads to a safe condition
 - emergency stop controls provided and to be readily accessible
 - position and marking of controls to be visible and identifiable
 - consideration of ergonomic principles.

C6.7 Systems failures and system reliability

- Meaning of the term 'system'
- Principles of system failure analysis – holistic and reductionist approaches and application to actual examples
- Use of calculation in the assessment of system reliability: parallel, series and mixed systems, common mode failures, principles of human reliability analysis
- Methods for improving system reliability: use of reliable components, quality assurance, parallel redundancy; standby systems, minimising failures to danger; planned preventive maintenance; minimising human error.

Relevant statutory provisions

The Supply of Machinery (Safety) Regulations 2008 – Schedule 2

Workplace (Health, Safety and Welfare) Regulations 1992

Provision and Use of Work Equipment Regulations 1998 (Regulations 10-19)

Recommended tuition time not less than 11 hours

Element C7: Work equipment (mobile, lifting and access)

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- C7.1 Describe the main hazards and control measures associated with commonly encountered mobile work equipment
- C7.2 Describe the main hazards and control measures associated with commonly encountered lifting equipment
- C7.3 Describe the main hazards and control measures associated with commonly encountered access equipment and equipment for working at height.

Content

C7.1 Mobile work equipment: hazards and control measures

Hazards

- The applications of different types of mobile work equipment (self-propelled, towed, attached, pedestrian-controlled and remotely-controlled) - to include lift trucks (counterbalance, reach, rough terrain, telescopic materials handlers, side loading trucks, pedestrian controlled trucks), agricultural tractors and works vehicles
- The hazards associated with mobile work equipment (rollover, overturning, suitability for carrying passengers, unauthorised start-up, safe operating station/platform, overrun of speed, contact with wheels and tracks, falls of objects, moving parts/drive shafts/power take-offs, over-heating)
- The hazards associated with the energising (electrical, LPG, diesel) of mobile work equipment.

Control measures

- The control measures to be used in the use of mobile work equipment (self-propelled, towed, attached, pedestrian-controlled and remotely-controlled), including safe layout of areas where mobile equipment is used and the protection of pedestrians
- The use of lift trucks to move people – conditions and equipment necessary, other attachments used on lift trucks
- The importance of roll-over protection, falling objects protection, speed control systems (stopping and emergency braking), guards, barriers and restraining systems, means of fire fighting, vision aids (plane, angled and curved mirrors, Fresnel lenses, radar, CCTV)
- The requirements for the training of lift truck operators (basic, specific job training and familiarisation).

C7.2 Lifting equipment: hazards and control measures

Hazards

- The applications and different types of lifting equipment including cranes (mobile cranes, tower cranes, overhead cranes) and hoists
- The hazards associated with cranes and lifting operations
- The main hazards associated with the use of: hoists (gin wheel, construction site platform hoist) and lifts (passenger and goods, scissor, vehicle inspection, MEWPs) and methods of controlling the associated risks.

Control measures

- The control measures for the use of: cranes (selection, siting, and stability of cranes); hoists and lifts; integrity of lifting equipment; competence of personnel; maintenance, inspection; and statutory examinations.

C7.3 Access and work at height equipment: hazards and control measures

Hazards

- The applications and different types of access and work at height equipment including self-propelled, trailer and truck-mounted hydraulic lifts (MEWPs), booms, scissor lifts, loaders and mobile work platforms
- The hazards arising from lack of mechanical strength of the carrier or lack of loading control and control devices; hazards to persons on or in the carrier (movements of the carrier, persons falling from the carrier, objects falling on the carrier); exceeding safe working load/persons permitted.

Control measures

- The appropriate control measures for use of access and work at height equipment: space and strength corresponding to the maximum number of persons and maximum working load; fitted with a suspension or supporting system; controlled by persons in the carrier; emergency stop devices; hold-to-run controls; prevention of tilting if there is a risk of the occupants falling; trapdoors open in a direction that eliminates any risk of falling; protective roof if risk of falling objects endanger persons, marked with maximum number of persons and maximum working load.

Relevant statutory provisions

Work at Height Regulations 2005

Workplace (Health, Safety and Welfare) Regulations 1992

Provision and Use of Work Equipment Regulations 1998

Lifting Operations and Lifting Equipment Regulations 1998

The Supply of Machinery (Safety) Regulations 2008 Schedule 2

Recommended tuition time not less than 6 hours

Element C8: Electrical safety and Electricity at Work Regulations 1989

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- C8.1 Outline the basic principles of electricity
- C8.2 Outline the dangers of electricity
- C8.3 Outline the issues relevant to the installation, use, inspection and maintenance of electrical systems
- C8.4 Outline the main principles for safe working in the vicinity of high voltage systems
- C8.5 Outline the main hazards, risks and controls associated with the use of portable electrical equipment.

Content

C8.1 Basic principles of electricity

- Differences between Low and High Voltage
- Potential difference, current, resistance, impedance, Ohm's law
- Basic electrical circuitry
- Earthing principles
- Significance of direct and alternating currents and electromagnetic radiation.

C8.2 Dangers of electricity

- Effects of electric shock on the body: pain, muscular contraction, respiratory failure, heart fibrillation, cardiac arrest, burns
- Factors influencing the severity of the effects of electric shock on the body: voltage, frequency, duration, impedance/ resistance, current path, direct and indirect shock
- Common causes of fires: overloading of conductors: overheating, ignition of flammable vapour, ignition of combustible material, breakdown of insulation
- Electric arcs: molten metal splash and radiation
- Circumstances giving rise to the generation of static electricity
- Hazards and controls for static electricity.

C8.3 Installation, use and inspection of electrical systems

- Meaning of duty holders' and 'construction'
- Importance of:
 - strength and capability of electrical equipment
 - insulation, protection and placing of conductors
 - reducing the risk of shock
 - excess current protection
 - cutting off supply and isolation
 - working space, access and lighting.
- Control measures:
 - selection and suitability of equipment
 - protective systems: fuses, reduced voltage systems, isolation, residual current devices, double insulation, earth free zones
 - inspection and maintenance strategy: user checks, formal visual inspections, combined inspection and tests, records of maintenance and tests, frequency of inspection and testing, competent persons, HSG107
- Relationship between BS 7671:2008 Requirements for Electrical Installations, IEE Wiring Regulations 17th Edition: (BS 7671: 2008) and The Electricity at Work Regulations 1989
- Importance of schemes of maintenance, schedules, plans and records
- Safe systems of work on installations made dead
- Safe systems of work and criteria of acceptability for live working
- Use of permits-to-work
- Meaning of 'competent person'.

C8.4 Safe working in the vicinity of high voltage systems

- Common high voltage systems and prevention of danger
- Competent and authorised persons role related to system modifications
- Safe systems of work, permit-to-work procedures
- Safe working near overhead power lines, underground cables – hazards and precautions
- High voltage glove working and live line overhead working.

C8.5 Portable electrical equipment

- Conditions and practices likely to lead to accidents, including unsuitable equipment, inadequate maintenance, use of defective apparatus
- Electrical risks from important portable appliances, eg, portable generators, arc/mig/tig welding
- Control measures, including portable appliance inspection and testing
- Aspects of supply, eg, height of cables.

Relevant statutory provisions

Electricity at Work Regulations 1989

Dangerous Substances and Explosive Atmospheres Regulations 2002

IEE Wiring Regulations 17th Edition: (BS 7671: 2008)

Recommended tuition time not less than 7 hours

Element C9: Construction hazards and controls

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- C9.1 Describe the scope and nature of construction activities
- C9.2 Explain the scope and application of the Construction (Design and Management) Regulations 2007
- C9.3 Explain the hazards associated with working at heights from fixed work or temporary platforms and the necessary precautions and safe working practices
- C9.4 Explain the hazards, precautions and safe working practices associated with demolition work
- C9.5 Explain the hazards associated with excavation work and the necessary precautions and safe working practices.

Content

C9.1 Scope and nature of construction activities

- Types of work: building works, renovation; alteration; maintenance of existing premises (occupied or unoccupied); civil engineering; works of engineering construction; and demolition
- Range of activities, including: site clearance; demolition; dismantling; excavation; loading, unloading and storage of materials; site movements; fabrication; decoration; cleaning; installation; removal and maintenance of services (electricity, water, gas); landscaping
- Particular construction issues relating to the: transitory nature of workers; temporary nature of construction activities and the constantly changing workplace; time pressures from clients; weather conditions; levels of numeracy and literacy of workers; non-English speaking workers.

C9.2 Scope and application of the Construction (Design and Management) Regulations 2007

- The particular duties under the Construction (Design and Management) Regulations 2007 of clients, designers, construction design and management (CDM) co-ordinators, principal contractors and contractors in relation to:
 - appointment and competence required of relevant parties
 - notification of projects (including the requirements for both CDM and non-CDM projects and for displaying the particulars on site)
 - preparation of pre-construction information (including the purpose and requirements)
 - the construction phase plan (including the purpose and typical content of the plan)
 - provision of appropriate and relevant information to all parties
 - preparation of the health and safety file (including the purpose and typical content of the file).

C9.3 Working at height from fixed or temporary platforms

- The hazards associated with working at heights
- The safe use of temporary (immobile) access equipment including ladders, trestles, scaffolds – simple independent and tower scaffolds
- The requirements for the erection, use and dismantling of scaffolds and falsework
- Inspection of working platforms above 2 metres (Regulation 12 Work at Height Regulations 2005)
- The hazards associated with falling materials and appropriate precautionary measures
- Safe methods for roof work - precautions during work on fragile roofs, edge protection for flat and sloping roofs
- The means of temporary access types and safety features of cradles, boatswains' chairs, rope access and positioning systems
- The use, application, selection and precautions in use of personal and collective fall arrest devices (safety nets, airbags, belts and harnesses).

C9.4 Demolition work

- The main techniques in demolition of buildings and the associated hazards and safe working practices with reference to:
 - falling materials; premature collapse of buildings, materials of construction
 - planning, structural surveys and surveys for hazardous substances, provision of working places and means of access/egress, use of method statements and permits-to-work, security of site boundaries and protection of the public.

C9.5 Excavations

- Hazards and controls associated with excavation work:
 - collapse; access; falls of persons, objects and vehicles; use of transport; flooding
 - buried services: types and consequences of damage
 - need for temporary shoring (drag boxes, piling)
 - methods for checking for buried services and the precautions to be observed
 - use of 360° excavators.
- The requirements for statutory inspections and examinations of excavations.

Relevant statutory provisions

Construction (Head Protection) Regulations 1989

Construction (Design and Management) Regulations 2007

Work at Height Regulations 2005

Lifting Operations and Lifting Equipment Regulations 1998

New Roads and Street Works Act 1991

Notification of Conventional Tower Cranes Regulations 2010

Recommended tuition time not less than 7 hours

Element C10: Workplace transport and driving for work

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

C10.1 Explain the hazards, risks and control measures for safe workplace transport operations

C10.2 Outline the factors associated with driving at work that increase the risk of an incident and the control measures to reduce work-related driving risks.

Content

C10.1 Hazards, risks and control measures for workplace transport operations

- Typical hazards leading to loss of control; overturning of vehicles; collisions with other vehicles, pedestrians and fixed objects
- Non-movement related hazards, ie, loading, unloading and securing loads; sheeting; coupling; vehicle maintenance work
- Conditions and environments in which each hazard may arise
- Control measures for safe workplace transport operations:
 - suitability and sufficiency of traffic routes; management of vehicle movements; environmental considerations (visibility, gradients, changes of level, surface conditions); maintenance of vehicles; driver protection and restraint systems; segregating of pedestrians and vehicles and measures to be taken when segregation is not practicable; protective measures for people and structures (barriers, marking signs, warnings of vehicle approach and reversing); site rules; selection and training of drivers; management systems for assuring driver competence including local codes of practice.

C10.2 Driving at work

- Extent of work related road injuries and fatalities
- Factors associated with driving at work that increase the risk of being involved in a road traffic incident (distance, driving hours, work schedules, stress due to traffic and weather conditions etc)
- Managing work-related road risk:
 - policy covers work-related road risk
 - systems to manage work-related road risk
 - selection and management of fleet
 - monitoring performance to ensure policy is effective eg collection of information, reporting of work-related road incidents by employees
 - organisation and structure.

- Risk assessment.
- Evaluating the risks:
 - the driver (competency, fitness and health, training)
 - the vehicle (suitability, condition, safety equipment, safety critical information, ergonomic considerations)
 - the journey (routes, scheduling, sufficient time, weather conditions).
- Control measures to reduce work related driving risks
 - eg, checking drivers' licences and documentation; driver training; vehicle checks; journey planning.

Relevant statutory provisions

The Provision and Use of Work Equipment Regulations 1998 – Part III in particular
 The Health and Safety (Safety Signs and Signals) Regulations 1996

Tutor references

Workplace transport safety – An employers' guide (HSG136) HSE Books, SBN 0-71766754-7
 Driving at work, Managing work-related road safety, HSE INDG382

Recommended tuition time not less than 4 hours

Element C11: Pressure system hazards and controls

Learning outcomes

On completion of this element, candidates should be able to demonstrate understanding of the content through the application of knowledge to familiar and unfamiliar situations and the critical analysis and evaluation of information presented in both quantitative and qualitative forms. In particular they should be able to:

- C11.1 Outline the principles of operation of liquefied gas storage; refrigeration systems; and heating systems
- C11.2 Outline the key features and safety requirements for 'simple' unfired pressure systems
- C11.3 Outline the key features and safety requirements for process pressure systems
- C11.4 Outline, the likely causes of the failure of pressure systems, and the testing and prevention strategies that can be used.

Content

11.1 Principles

- The hazards of steam; the mechanism of a steam explosion (eg Corus Blast Furnace, 2001); properties of liquid petroleum gas; advantages and disadvantages of storage in spheres vs. torpedoes
- The liquefaction of gases for bulk storage under pressure/refrigeration; the operation of a closed circuit refrigeration cycle
- The operation of basic steam heating system
- Meaning of pressure, positive pressure and negative pressure.

11.2 Simple pressure systems

- Meaning of "vessel"; unfired; contents; shape, construction and materials; gauge pressure; operating conditions; transportable gas containers
- The essential safety requirements; pressurised components; steel and aluminium vessels; non-pressurised components
- Types of inspection, frequencies and statutory basis for examination of simple pressure systems.

11.3 Pressure systems

- Meaning of 'relevant fluids', the scope of what constitutes a 'pressure system'; steam at any pressure
- The key components and safety features of pressure systems; temperature, pressure, level indicators; pressure relief valves; fuel cut-off; bursting discs; level replenishment; water treatment.

11.4 Failure of pressure systems

- The hazards of over pressure and over temperature in pressure systems
- The mechanisms of mechanical failure that lead to a loss of containment: excessive stress; abnormal external loading; overpressure; overheating; mechanical fatigue and shock; thermal fatigue and shock; brittle fracture; creep; hydrogen attack; corrosive failure with reference to case studies; examples of pressure system failures
- Prevention strategy: design and construction, repair and modification, information and marking, safe operating limits, written scheme of examination, maintenance and record keeping, competent persons.

Relevant statutory provisions

Pressure Equipment Regulations 1999

Pressure Systems Safety Regulations 2000

Simple Pressure Vessels (Safety) Regulations 1991

Recommended tuition time not less than 5 hours

4.2 Unit D: Application of health and safety theory and practice

Learning outcomes

On completion of this element, candidates should be able to:

- Demonstrate the ability to apply the knowledge and understanding gained from their studies of elements of Units A, B and C in a practical environment
- Carry out a detailed review of the health and safety performance of a workplace or organisation
- Critically analyse and evaluate information gathered during the review
- Produce a justified action plan to improve performance.

Content

This unit contains no additional syllabus content. However, completion of study for units A, B and C is recommended in order to undertake the Unit D assignment. Candidates should refer to the separate Unit D Guidance which is available to download from the Students section of the website, or from their accredited course provider.

4.2.1 Purpose and aim

The aim of the assignment is to produce an overall review of the health and safety management system of an organisation and indicate, using risk assessment, the priorities for the organisation for the future.

The focus of the Unit D assignment should be the application of the knowledge and understanding developed in Units A, B and C to a real workplace situation. It provides opportunities for the candidate to carry out research appropriate to a qualification that is comparable to degree-level. Candidates are required to demonstrate the ability to carry out a range of activities that would be expected of a health and safety practitioner.

The report should be organised in sections which match those set out in the assignment mark scheme. The sections are:

- Executive Summary
- Introduction
- Review of the Health and Safety Management System
- Hazard Identification
- Risk Assessment
- Conclusions
- Recommendations
- Action Plan
- References / Bibliography
- Appendices.

4.2.2 Marking

The Unit D assignment is marked by appropriately qualified Examiners appointed by NEBOSH. Candidates must achieve the pass standard (50%) in Unit D in order to satisfy the criteria for the qualification.

4.2.3 Assessment location

The Unit D assignment must be carried out in the candidate's own workplace. Where the candidate does not have access to a suitable workplace, the accredited course provider should be consulted to help in making arrangements for the candidate to carry out the assignment at suitable premises.

Candidates do not require supervision when carrying out the practical application, but the candidate must sign a declaration that Unit D is their own work.

Candidates and employers should be aware that the status of the report undertaken to fulfil the requirements of Unit D is **for educational purposes only**. It *does not* constitute an assessment for the purposes of any legislation or regulations.

4.2.4 Submission of completed work

Assignment reports should be submitted before the set submission date in either March or September.

The actual dates will be published by NEBOSH annually. Candidates intending to submit an assignment must register through their accredited course provider using the appropriate form and paying the appropriate fee. On registration candidates will receive a submission form which must accompany the assignment report.

Assignments must be submitted directly to NEBOSH. They should be sent by Royal Mail Special Delivery or a courier service that provides a track-back facility (this is a next day guaranteed delivery service). Failure to use such a service close to the closing date may result in arrival after the closing date and rejection of the assignment.

Candidates are strongly advised to keep a copy of their assignment report.

No refund of fees will be made in cases where assignments are rejected or where candidates register but fail to submit.

4.2.5 Further information

Further detailed information regarding Unit D including forms and mark schemes can be found in a separate guidance document for candidates and accredited course providers available from the NEBOSH website (www.nebosh.org.uk): *"Unit D Assignment guidance and information for candidates"*

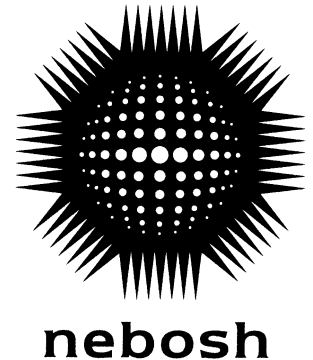
5. Sample examination question papers

5.1 Unit A: Managing health and safety

THE NATIONAL EXAMINATION BOARD IN
OCCUPATIONAL SAFETY AND HEALTH

NEBOSH NATIONAL DIPLOMA IN
OCCUPATIONAL HEALTH AND SAFETY

Unit A: Managing health and safety



[DATE]

3 hours, 0930 to 1230

10 minutes reading time is allowed before the start of this examination. You may not write anything during this period.

Answer both Section A and Section B

SECTION A

This section contains six questions. Answer **ALL SIX** questions.

All questions carry equal marks.

The maximum marks for each question, or part of a question, are shown in brackets.

You are advised to spend about **15 minutes** on each question.

Start each answer on a new page.

- 1 (a) **Explain** why organisations often identify the costs of health and safety control measures much more easily than they identify the costs that can arise from poor health and safety standards. (6)
- (b) **Outline**, with examples, the meaning of the terms '*insured*' and '*uninsured*' costs in connection with accidents and incidents at work **AND outline** the relative size of these two costs in an organisation as demonstrated by accident costing studies. (4)
- 2 The following table shows the number of lost-time accidents recorded at two organisations involved in similar manufacturing processes. The figures in brackets show the average numbers of employees at each organisation for the year in question.

Year	Organisation A	Organisation B
2005	22 (2500)	8 (250)
2006	24 (2450)	8 (265)
2007	31 (2300)	8 (300)
2008	30 (2100)	7 (340)

- (a) **Calculate AND compare** the annual lost-time accident incidence rates for the two organisations for the years shown **AND comment** on any trends. (5)
- (b) **Outline** any possible limitations with the data itself, or the way that it is collected, that might make direct comparisons of the rates at the two organisations unreliable or misleading. (5)
- 3 (a) **Outline** reasons for establishing effective consultation arrangements with employees on health and safety matters in the workplace. (4)
- (b) **Outline** a range of formal and informal consultation arrangements that may contribute to effective consultation on health and safety matters in the workplace. (6)
- 4 A risk assessment has identified the need to introduce a safe system of work for cleaning some moving machinery. The system proposed would allow the machinery to be cleaned by the operator whilst it was running at normal speed with the guards removed. This would present a risk of injury from the moving parts. To reduce this risk it is proposed that the cleaning is undertaken with a long-handled device which would enable the operator's hands to be kept away from the moving parts.
- (a) **Outline** the extent to which the proposed system of work meets the 'general principles of prevention' referred to in Regulation 4 and Schedule 1 of the Management of Health and Safety at Work Regulations 1999. ***Your answer should refer to the specific 'general principles of prevention' which are relevant to this scenario.*** (5)
- (b) **Outline** the steps that an organisation should take to ensure the effective implementation of a new safe system of work, assuming that a detailed risk assessment has already been undertaken. (5)
- 5 Human failure was identified as a significant factor in an accident involving a crane. An employee was seriously injured when struck by material being transported by the crane.
- Outline** the types of human failure which may have contributed to the accident **AND** in **EACH** case **give** examples relevant to the scenario to illustrate your answer. (10)
- 6 A Health and Safety Executive inspector visits a small, limited company. The inspector decides to serve a prohibition notice on the employer in respect of an unguarded machine.
- (a) **Identify** the legal criteria that must be satisfied before a prohibition notice may be lawfully served. (2)

- (b) If the employer chooses to appeal against the notice **identify** the effect of the appeal **AND** the timescale within which an appeal must be made. (2)

At a subsequent visit the inspector discovers that the unguarded machine is still in use by an employee and that this activity has been agreed by the Operations Director. The inspector decides to bring a prosecution against the Operations Director by virtue of Section 37 of the Health and Safety at Work etc Act 1974 in respect of the breach of the prohibition notice.

- (c) **Outline** the legal criteria that the inspector would need to satisfy to bring a successful prosecution. (3)

- (d) **Identify** the maximum penalties that would be available on conviction of the Operations Director. (3)

SECTION B

This section contains five questions. Answer **THREE** questions only.

All questions carry equal marks.

The maximum marks for each question, or part of a question, are shown in brackets.

You are advised to spend about **30 minutes** on each question.

Start each answer on a new page.

- 7** A low pressure storage vessel is connected via pipework to a manufacturing plant which could, in the event of malfunction, generate a pressure great enough to rupture the vessel. To prevent this a pressure detector is installed in the low pressure storage vessel. If pressure starts to rise above an acceptable level the detector activates a valve control system. This in turn closes the inlet valve to the vessel isolating it from excessive pressure. It has been estimated that pressure great enough to rupture the low pressure storage vessel would be generated once every four years on average.

Reliability data for the system is given below.

Component	Reliability
Pressure detector	0.95
Valve control system	0.99
Inlet valve	0.8

- (a) **Construct** an event tree for the protective system described above **AND** use it to **calculate** the frequency of a rupture of the low pressure storage vessel. (12)

- (b) It is proposed that, in addition to the protective system described above, the low pressure storage vessel is also fitted with a suitable pressure relief valve (reliability 0.9).
- Assuming that the vessel would only rupture if both the protective system and the pressure relief valve failed at the same time, **calculate** the frequency of rupture of the low pressure storage vessel in these circumstances. (4)
- (c) **Outline** the issues that would need to be considered when deciding whether both protective systems were needed on the low pressure storage vessel. (4)
- 8 A forklift truck is used to move loaded pallets in a large distribution warehouse. On one particular occasion the truck skidded on a patch of oil. As a consequence the truck collided with an unaccompanied visitor and crushed the visitor's leg.
- (a) **Outline** reasons why the accident should be investigated. (4)
- (b) The initial responses of reporting and securing the scene of the accident have been carried out.
- Outline** the actions which should be taken in order to *collect evidence* for an investigation of the accident. (8)
- (c) The investigation reveals that there have been previous skidding incidents which had not been reported and the company therefore decides to introduce a formal system for reporting 'near miss' incidents.
- Outline** the factors that should be considered when developing and implementing such a system. (8)
- 9 The case of R v Swan Hunter Shipbuilders Ltd and Another [1982] arose from a serious fire during a ship repair at Swan Hunter's shipyard. Swan Hunter were convicted in the Court of Appeal.
- (a) **Identify** the specific provisions of the Health and Safety at Work etc Act 1974 under which Swan Hunter Shipbuilders Ltd (Swan Hunter) were prosecuted **AND** in **EACH** case **outline** the reasons why the company was convicted. (6)
- (b) The Management of Health and Safety at Work Regulations 1999 were not in force at the time of this case. Had these Regulations been in force, **identify** the requirements of the Regulations under which Swan Hunter could have been prosecuted specifically in connection with the fire incident **AND outline** reasons in **EACH** case.

Requirements in the Regulations relating to competent health and safety assistance and emergency procedures should be excluded.

(8)

- (c) The Management of Health and Safety at Work Regulations 1999 are supported by an Approved Code of Practice and guidance. In criminal proceedings **outline** the legal status of:

(i) an Approved Code of Practice;

(3)

(ii) guidance.

(3)

- 10** (a) **Explain** the difference between:

(i) common law and statute law;

(4)

(ii) civil law and criminal law.

(6)

- (b) Employers have a duty under common law to take reasonable care to ensure the safety of their employees.

Referring to relevant case law where appropriate, **outline** the nature of this duty in terms of:

(i) safe plant and equipment;

(6)

(ii) safe places of work.

(4)

- 11** As the Health and Safety Adviser to a large organisation, you have decided to develop and introduce an in-house auditing programme to assess the effectiveness of the organisation's health and safety management arrangements.

Describe the organisational and planning issues to be addressed in the development of the audit programme.

You do not need to consider the specific factors to be audited.

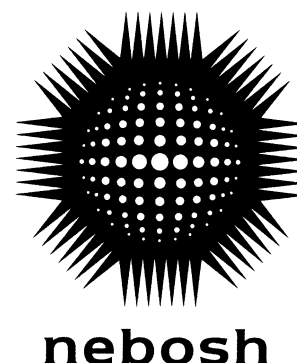
(20)

5.2 Unit B: Hazardous agents in the workplace

THE NATIONAL EXAMINATION BOARD IN
OCCUPATIONAL SAFETY AND HEALTH

NEBOSH NATIONAL DIPLOMA IN
OCCUPATIONAL HEALTH AND SAFETY

Unit B: Hazardous agents in the workplace



[DATE]

3 hours, 0930 to 1230

10 minutes reading time is allowed before the start of this examination. You may not write anything during this period.

Answer both Section A and Section B

SECTION A

This section contains six questions. Answer **ALL SIX** questions.

All questions carry equal marks.

The maximum marks for each question, or part of a question, are shown in brackets.

You are advised to spend about **15 minutes** on each question.

Start each answer on a new page.

- | | | |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 1 | Outline signs that could indicate to an employer that an employee has an alcohol problem. | (10) |
| 2 | (a) Outline the nature and properties of alpha particles. | (4) |
| | (b) Outline the principles that could be used to control exposure to alpha particles. | (6) |
| 3 | (a) Identify the possible range of specialists involved in Occupational Health provision in a large manufacturing company. | (5) |
| | (b) Outline the specific activities that occupational health specialists could undertake as part of a programme to reduce accidents and absences relating to manual handling. For EACH activity identify the most appropriate occupational specialist to undertake the activity. | (5) |

- 4 A welder undertakes work in an open plan workshop.

Outline the factors to be considered when *selecting* suitable Respiratory Protective Equipment for this work.

(10)

- 5 Work related upper limb disorders (WRULDs) can develop if ergonomic principles are not followed when designing work tools and work equipment.

(a) **Outline** what is meant by the term '*ergonomic principles*'.

(2)

(b) **Outline** how the *design* of work tools and work equipment can help to minimise the risk of a person developing a WRULD.

(8)

- 6 Employees can be exposed to corrosive substances.

(a) **Give** the meaning of the term '*corrosive*'.

(2)

(b) The data below, for three forms of the same product, is taken from a supplier's catalogue.

Using the data **outline** the likely *routes of entry* **AND** *effects* of exposure when handling **EACH** of these products.

(8)

Product Code	Chemical name/formula	Concentration	Physical Form
C1	Sodium Hydroxide (NaOH)	99.9%	Pellets
C2	Sodium Hydroxide (NaOH)	97%	Powder
C3	Sodium Hydroxide (NaOH)	50% in water	Liquid

SECTION B

This section contains five questions. Answer **THREE** questions only.

All questions carry equal marks.

The maximum marks for each question, or part of a question, are shown in brackets.

You are advised to spend about **30 minutes** on each question.

Start each answer on a new page.

- 7 (a) **Identify** the published sources of information an employer could use to determine if carcinogens are used in their workplace. (4)
- (b) **Outline** the control measures that should be used when, because of the nature of the work, it is not possible to eliminate a carcinogen or substitute it with an alternative substance. (16)
- 8 (a) **Outline** the principles of a prospective cohort study, as used in epidemiology. (4)
- (b) National public health monitoring has recorded several hundred cases of an illness. In at least half the cases the cause has been confirmed, by laboratory tests, as a new strain of virus.
- Outline** the possible data **AND** data sources that could be used for a prospective cohort study of this outbreak. (10)
- (c) **Outline** factors that may affect the reliability of such cohort studies. (6)
- 9 A company that operates hotels and health spas recognises the risks associated with the legionella bacteria.
- (a) **Identify** specific locations where there may be growth of, or potential exposure to, legionella for employees **AND** guests. (5)
- (b) **Outline** the control measures that this company should implement to minimise exposure to legionella bacteria. (15)
- 10 A noise survey is to be carried out in a large enclosed turbine hall within an electricity generating power station.
- In the turbine hall there are three steam driven turbines and other mechanical plant associated with power generation.
- Exposure to noise is a considerable problem for the 50 employees who work on each shift in the turbine hall especially when all three turbines are running.
- Explain** how a noise survey should be planned and undertaken in order to assess employees' noise exposures in this workplace. (20)

- 11** A manufacturing process involves the use of three organic solvents, exposure to which is controlled by local exhaust ventilation (LEV) and personal protective equipment. The LEV system is regularly inspected and is subject to thorough examination and testing on an annual basis.
- (a) **Outline** how the exposure of the process workers to solvent vapours could be assessed. **(10)**
- (b) **Outline** how the data obtained could be used to determine if the exposure of the process workers to the solvents is adequately controlled. **(10)**

5.3 Unit C: Workplace and work equipment safety

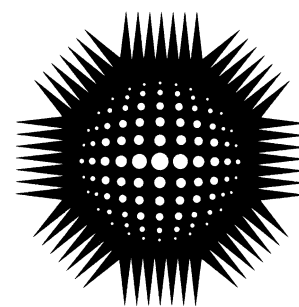
THE NATIONAL EXAMINATION BOARD IN
OCCUPATIONAL SAFETY AND HEALTH

NEBOSH NATIONAL DIPLOMA IN
OCCUPATIONAL HEALTH AND SAFETY

Unit C: Workplace and work equipment

[DATE]

3 hours, 0930 to 1230



nebosh

10 minutes reading time is allowed before the start of this examination. You may not write anything during this period.

Answer both Section A and Section B

SECTION A

This section contains six questions. Answer **ALL SIX** questions.

All questions carry equal marks.

The maximum marks for each question, or part of a question, are shown in brackets.

You are advised to spend about **15 minutes** on each question.

Start each answer on a new page.

- 1 **Outline** the main *design* features of a warehouse and associated traffic routes intended to reduce the risks associated with internal transport. (10)

- 2 A petrol storage tank in a bund containing three other similar tanks is overfilled during a transfer operation resulting in a large spill of petrol into the bund. The petrol vapour is ignited from a remote source causing a catastrophic explosion and fire involving the whole installation.
 - (a) **Identify** the design and construction measures that could have prevented such an event. (4)
 - (b) **Outline** the range of measures that would be necessary to mitigate the effects of such an event. (6)

- 3 A design for a multi-fuel combined heat and power (CHP) power station allows for either coal, oil or natural gas burning. The proposed site will include the necessary fuel storage facilities and water treatment plant. The installation will be located on the bank of a river estuary and receive deliveries by road, pipeline and ship.
- Identify** potential pollutants **AND** their related source:
- (a) during normal operation; (5)
 - (b) during abnormal operation. (5)
- 4 A production plant uses a potentially explosive powder. Pressurised nitrogen is the transporting and *inerting* gas within the plant.
- (a) **Give** the meaning of '*inerting*'. (2)
 - (b) **Outline** practical reasons why inerting was considered necessary for this process. (3)
 - (c) **Identify** the risks from inert atmospheres during maintenance. (2)
 - (d) **Outline** control measures that reduce the risks from inert atmospheres during maintenance. (3)
- 5 The owners of a large distribution warehouse business have secured a contract from a stationery manufacturer. Their insurers have recommended that the proposed storage facility is sprinkler protected.
- Outline** the factors to be considered in providing an adequate sprinkler system for the storage facility. (10)
- 6 With reference to the *mechanical* hazards associated with the operation of a hydraulic robotic arm on a production line, **outline** a range of measures aimed at minimising the risk of injury. (10)

SECTION B

This section contains five questions. Answer **THREE** questions only.

All questions carry equal marks.

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You are advised to spend about **30 minutes** on each question.

Start each answer on a new page.

- 7 A property development company has acquired a former Victorian grain warehouse, abandoned for the past twenty years, to convert into luxury apartments. A Principal Contractor has been appointed for the entire project which involves total removal of the building internals followed by construction of the apartments within the building shell. The demolition work is sub-contracted to a specialist company.
- (a) Under the Construction (Design and Management) Regulations 2007 (CDM);
- (i) **outline** the specific duties of the Principal Contractor with regard to the demolition phase of the project.
- Your answer should exclude requirements to check on client's duties.*** (7)
- (ii) **identify** additional duties specific to demolition under CDM. (3)
- (b) **Outline** the content of the Pre-Construction Information that will be of specific interest to the demolition contractor. (10)
- 8 (a) **Outline** a range of factors that may cause instability of a mobile crane. (8)
- (b) **Outline** control measures that should be taken to reduce the likelihood of a mobile crane overturning during a lifting operation. (12)
- 9 A serious accident occurred when a threaded steel rod in the braking mechanism of a hoist broke. An investigation revealed that the cause of the breakage was fatigue failure.
- (a) **Outline** the mechanism and characteristics of fatigue failure. (6)
- (b) **Identify THREE** factors which can contribute to such a failure **AND** for **EACH** factor **outline ONE** circumstance in which it may occur. (6)
- (c) **Outline** the measures that could have been taken to minimise the likelihood of such a failure. (8)
- 10 **Outline** the precautions that can be taken to minimise the risks associated with a cable strike when excavating near underground electrical cables. (20)

- 11 An enclosed reactor vessel 30 metres high with a diameter of 10 metres needs cleaning, inspection and repair. The reactor was previously used for reacting flammable solids and gases that formed a toxic, acidic product.

It is not possible to avoid entry and the relevant personnel are suitably fit, trained, informed and supervised.

Outline additional arrangements that should be considered in order to comply with the Confined Spaces Regulations 1997.

(20)



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