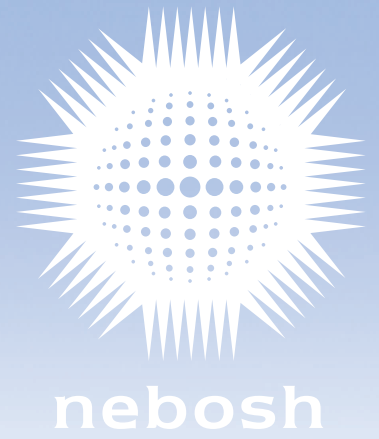


November 2015

Guide to the NEBOSH International Diploma in Occupational Health and Safety



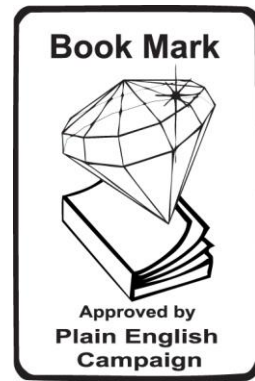
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Health and Safety Adviser, Dubai World Trade Centre

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Guide to the NEBOSH International Diploma in Occupational Health and Safety (November 2015 specification)

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1. Introduction

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

The International Diploma is modelled on the NEBOSH National Diploma in Occupational Health and Safety. The key difference between the two qualifications is in the applicability of legal requirements. Rather than be guided by a specifically UK framework, the International Diploma takes a risk management approach based on best practice and international standards, such as International Labour Organisation (ILO) codes of practice. Local laws and cultural factors form part of the study programme where relevant and appropriate.

1.1 Benefits for employers

Despite the increasing global recognition of the importance of health and safety at work, accidents and work-related ill-health continue to affect all types of workplaces and occupations. The ILO estimates that 6,300 people die daily as a result of occupational accidents or work-related diseases - more than 2.3 million deaths worldwide per year. At least 10% of these deaths are due to the 337 million accidents at work that occur annually. There are an estimated 500 –2000 non-fatal injuries for every fatal injury (including 160 million cases of work-related disease), many of which result in lost earnings, lost jobs and permanent disability and poverty.

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 the UK economy alone, the estimated annual cost of occupational injury and illness in 2014/15 is £14.3 billion.

The vast majority of workplace injuries, accidents and ill-health are avoidable by good health and safety management; it makes good business sense. Qualified health and safety professionals are an asset to their organisation; they can help to reduce costs by preventing accidents and ill health of employees, without incurring unnecessary expense by over-reacting to trivial risks. This in turn can lead to improved productivity and raising workforce morale. Effective health and safety management should, therefore, be recognised as an essential element of a successful management strategy.

Courses leading to the NEBOSH International 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 Designatory letters

Holders of the NEBOSH International Diploma in Occupational Health and Safety may use the designatory letters 'IDipNEBOSH' after their name.

1.3 Professional membership

The qualification meets the academic requirements for application for Graduate Membership (Grad IOSH) of the Institution of Occupational Safety and Health (IOSH – www.iosh.co.uk).

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This is the first step to becoming a Chartered Health and Safety Practitioner as a Chartered Member of IOSH (CMIOSH).

Holders of the International Diploma are able to waive the Board of Certified Safety Professionals' Associate Safety Professional (ASP) examination so that, if they meet all other requirements, they may sit directly for the Certified Safety Professional (CSP) examination.

Holders of the NEBOSH International Diploma in Occupational Health and Safety *and* either the NEBOSH National or International Certificate in Construction Health and Safety meet the headline entrance criteria requirements for Registered Construction Safety Practitioner (RMaPS) and membership of the Association for Project Safety (APS).

The International Diploma is also accepted by the International Institute of Risk and Safety Management (IIRSM) as meeting the academic requirements for full membership (MIIRSM).

1.4 Qualification level and UK accreditation

NEBOSH is intending to apply for the NEBOSH International Diploma in Occupational Health and Safety (November 2015 specification) to be accredited and credit rated by the Scottish Qualifications Authority (SQA - www.sqa.org.uk) for delivery across the UK. The August 2011 specification is rated within the Scottish Credit and Qualifications Framework (SCQF - www.scqf.org.uk) at SCQF Level 10 with 47 SCQF credit points. It is anticipated that the revised November 2015 specification will be at the same level with 48 credits.

For users in England, Wales and Northern Ireland, this is comparable to a Vocationally-Related Qualification (VRQ) at Level 6 within the Regulated Qualifications Framework (RQF) 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).

1.5 Key topics covered

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

1.6 Course tuition and private study time requirements

Unit IA: 86 hours tuition and 68 hours private study	Total: 154 hours
Unit IB: 65 hours tuition and 50 hours private study	Total: 115 hours
Unit IC: 70 hours tuition and 50 hours private study	Total: 120 hours
Unit DNI: 5 hours tuition and 72 hours private study	Total: 77 hours

A programme of study therefore needs to be based around a minimum of **226 taught hours** and approximately **240 hours of private study** for an overall total of **466 Hours**.

A full-time block release course would be expected to last for a minimum of 33-working days and a part-time day release course would be spread over at least 33-weeks. The tuition hours

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should be added to the recommended private study hours to give the minimum number of hours for students studying by open or distance learning.

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.

1.7 Entry requirements

The NEBOSH International Diploma syllabus assumes that students will have knowledge of health and safety equivalent to that provided by the NEBOSH International General Certificate (IGC).

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

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 student's own workplace, which must also be in English. Students should discuss this requirement 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 students

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

NEBOSH recommends that students 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 order to be accepted onto an International 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.

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

1.9 Legislation

The syllabus refers to international conventions and recommendations. Where 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 not refer to specific legislation, but will refer to International conventions, recommendations and good practice as indicated in the syllabus.

1.10 Legislative updates

Relevant new international conventions and recommendations will become examinable in detail six months after their date of introduction. However, students 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 international conventions and recommendations, where relevant to an examination question, will be given credit.

Please note, NEBOSH will not ask questions related to international conventions and recommendations that have been repealed, revoked or otherwise superseded.

NB: Accredited course providers are expected to ensure their course notes remain current with regard to new international conventions and recommendations.

1.11 National Occupational Standards (NOS) and best practice

The syllabus is mapped to the relevant National Occupational Standard (NOS). The mapping of the syllabus units to each NOS can be found on pages 13-16.

1.12 Qualification type

NEBOSH qualifications are categorised as 'Other' qualifications by SQA Accreditation in Scotland. These are categorised as 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 combine 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.

1.13 Qualification progression

Students who wish to continue their studies in the UK may wish to consider the NEBOSH National Diploma in Occupational Health and Safety. Unit DNI is a 'common unit' and forms part of the National and International Diplomas. Therefore, students wish to study the National Diploma will only need to pass three additional units to achieve this further qualification.

Students who have achieved the NEBOSH International Diploma may be considering further health and safety study. NEBOSH has entered into partnership with the University of Hull to offer a range of Masters Degrees.

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A number of other 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 eg, 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: Students are advised to check up-to-date information on course dates directly with accredited course providers. It is also recommended that students only accredited course providers which appear on the NEBOSH website; this ensures that those accredited course providers have met NEBOSH's quality standards.

1.15 Examination dates

'Standard' examination dates for this qualification are available annually in January and July. Unit DNI assignment submission dates are available annually in February, May, August and November.

'On-demand' examinations are **not** available for this qualification.

1.16 Specification date

The November 2015 specification for this qualification replaces the previous February 2010 specification for all examinations from (and including) January 2017.

1.17 Syllabus development and review

The syllabus has been developed by NEBOSH following extensive consultation with key stakeholders, notably previous Diploma students, 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 students

Further information for students, including a qualification overview leaflet and a sample examiners' report, can be found via the NEBOSH website (www.nebosh.org.uk).

1.19 Further information for accredited course providers

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

2. Qualification structure

2.1 Student enrolment

- At the start of their studies, students will enrol with NEBOSH. The enrolment period is 5-years.
- On completion of the first successful unit, the enrolment start date will change to the same as the declaration date (the date which appears on the unit certificate) of the successful unit. The student will then have 5-years from this new date to achieve the qualification.
- All units will have a 5-year validity period. Units which are older than 5-years will no longer be valid and will not count towards the qualification grading. Any such unit/s will need to be retaken by the student to allow the student to complete the qualification.
- Once the oldest unit is no longer valid ie it is 5 or more years older than the current date, the enrolment start date will move to the declaration date of the second successful unit.
- The student's enrolment period will end:
 - when the student has successfully completed all 4 units; or
 - when all successful units have expired (ie the declaration date/s are 5 or more years older than the current date; or
 - 5-years from the enrolment start date if the student has not attempted any unit assessment; or
 - 5-years from the enrolment start date if unit assessment/s have been attempted but the student has received a 'Refer' result and/or has been marked as 'absent'.
- If a student cannot complete all 4 units within the 5-year completion time-frame they may apply for a unit validity extension for each affected unit. Please refer to the 'Enrolment Policy for NEBOSH Diploma Level Qualifications' for further information.

2.2 Common unit and exemption

The NEBOSH National Diploma in Occupational Health and Safety shares a 'common unit' (Unit DNI) with the NEBOSH International Diploma in Occupational Health and Safety. Students can, therefore, take the assessments for Units IA, IB and IC and they will gain an additional qualification.

The 'common unit' can be used as an exemption against the International Diploma in Occupational Health and Safety for up to five years after the declaration date (the date printed on the unit certification) of Unit DNI. Likewise, holders of the International Diploma in Occupational Health and Safety will have five years to use their Unit DNI pass as an exemption against the same unit for the National Diploma in Occupational Health and Safety.

2.3 Unit assessments

The International Diploma in Occupational Health and Safety is divided into four units. All units are mandatory and there are no optional units. The student may choose to take the units together or at different times.

Unit IA: Managing health and safety

- Unit IA is a taught unit which is assessed by a 3-hour written examination

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- The written examination consists of 11 questions split into Section A and Section B
- Section A consists of 6 'short-answer' questions (10 marks each) – all questions are compulsory
- Section B consists of 5 'long-answer' questions (20 marks each) – the student answers 3 out of the 5 questions
- There is a total of 120 marks available for the paper; the total mark for the paper (Section A + Section B) will then be converted to a percentage
- Student scripts are marked by external examiners appointed by NEBOSH
- A sample examination question paper can be found in Section 6.

Unit IB: Hazardous substances/agents

- Unit IB is a taught unit which is assessed by a 3-hour written examination
- The written examination consists of 11 questions split into Section A and Section B
- Section A consists of 6 'short-answer' questions (10 marks each) – all questions are compulsory
- Section B consists of 5 'long-answer' questions (20 marks each) – the student answers 3 out of the 5 questions
- There is a total of 120 marks available for the paper; the total mark for the paper (Section A + Section B) will then be converted to a percentage
- Student scripts are marked by external examiners appointed by NEBOSH
- A sample examination question paper can be found in Section 6.

Unit IC: Workplace and work equipment safety

- Unit IC is a taught unit which is assessed by a 3-hour written examination
- The written examination consists of 11 questions split into Section A and Section B
- Section A consists of 6 'short-answer' questions (10 marks each) – all questions are compulsory
- Section B consists of 5 'long-answer' questions (20 marks each) – the student answers 3 out of the 5 questions
- There is a total of 120 marks available for the paper; the total mark for the paper (Section A + Section B) will then be converted to a percentage
- Student scripts are marked by external examiners appointed by NEBOSH
- A sample examination question paper can be found in Section 6.

Unit DNI: Application of health and safety management in the workplace

- Unit DNI consists of a written assignment set by NEBOSH
- The report should be approximately 8000 words in total, excluding the references, bibliography and appendices. No penalty will be applied to reports which exceed 8000 words but students should aim to keep their word count under 12000

- Submission dates for Diploma assignments are in February, May, August and November each year
- The assignment is marked by external examiners appointed by NEBOSH.

2.4 Assessment setting and marking

NEBOSH applies best practise in relation to assessment setting and marking. NEBOSH uses external assessment for written examinations and assignments: scripts are sent to NEBOSH and undergo rigorous marking, checking and results determination processes to ensure accuracy and consistency.

2.5 Unit pass standards

The pass standard for each unit may vary according to pre-determined criteria but is normalised to 45% for the written papers (Units IA, IB and IC) and 50% for the assignment unit (Unit DNI).

2.6 Unit certificates

Students who are successful in an individual unit will be issued with a unit certificate, normally within 40 working-days of the issue of the unit result notification. Units are not graded and the unit certificates will show a 'Pass' only.

2.7 Qualification grade

When students have been awarded a unit certificate for all four units (ie, have achieved a Pass in units IA, IB, IC and DNI), the percentage achieved for each of the units are added together and a final grade is awarded as follows:

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

2.8 Qualification parchment

Once a student has achieved a 'Pass' in all four units and the qualification grade has been awarded they are normally considered to have completed the qualification. A qualification parchment will be issued within 40 working-days of the unit result declaration date for the fourth successfully completed unit.

However, once the result of the fourth successfully completed unit has been issued the student has **20 working-days** 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).

2.9 Re-sitting unit/s

If a student's performance in any unit is lower than a 'Pass', the student may re-sit the unit/s in which they have been unsuccessful providing that this happens within the 5-year completion period. However, each re-sit will incur an additional fee.

Students may re-sit units at any time within their enrolment period. This includes re-sitting successful unit/s to try to improve the qualification grade. When all four units have been successfully completed, students will need to inform NEBOSH of their intention to re-sit the successful unit/s **within 20 working-days of the date of the results issue for the fourth unit**. There is no limit to the number of re-sits which can be taken within the enrolment period.

If a re-sit results in a lower mark than a previously declared mark for that unit, the highest mark will be used when calculating the qualification grade.

For the Unit DNI assignment, there is no limit to the number of submissions within the completion period. If a student gains lower than the pass standard 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.

If a student registers for any unit of the National Diploma whilst awaiting a result from a previous sitting of an examination that student may not seek a refund of the registration fee if they retrospectively claim exemption for that unit except in the case of an Enquiry About Result.

3. Policies

3.1 Requests for access arrangements/reasonable adjustments

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

Accredited course providers must make requests to NEBOSH for access arrangements or reasonable adjustments at least one month before the assessment.

For further details see the NEBOSH *“Policy and procedures for access arrangements, 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 a student who has been unable to demonstrate attainment because of temporary illness, injury, indisposition or an unforeseen incident at the time of the assessment.

Students who feel they have been 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. They must 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. This ensures that the declared results are a fair and equitable reflection of the standard of performance by students.

There are, however, procedures for students 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 students 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. These include collusion or use of unauthorised material by students, the failure to maintain appropriate records or systems by accredited course providers, and 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. Notes for tutors

4.1 Case studies / past incidents

The tutor references for Units A and C contain references to past incidents which were previously part of the syllabus content. These references can be used during teaching to help to illustrate the topic being taught. The references quoted are not an exhaustive list and tutors are at liberty to use different incidents to those quoted in the syllabus.

The case studies/past incidents will not be examinable.

4.2 Tutor references

Tutor references are given at the end of each unit and are split between statutory provisions and guidance documents. These references are given to aid tutors with the teaching of the syllabus content; they are not an exhaustive list and tutors can, therefore, use other references to those quoted in the syllabus.

4.3 Teaching of units

Although the syllabus sets out the Units and Elements in order tutors can teach the Units and Elements in an order that they are comfortable with. You will need to reflect this in the lesson plans which are submitted as part of the accreditation/re-accreditation process.

Element IA9 (the role of the health and safety practitioner) has been included within the content for Unit A but will not be examinable by the Unit IA written examination. The content of this element will be assessed only through Unit DNI.

4.4 Minimum standard of English required for tutors

Tutors who are based overseas and wish to deliver a course for the NEBOSH International Diploma must have a good standard of English. They must be able to articulate the concepts contained in the syllabus. The accredited course provider must provide evidence of the tutor's standard of English when submitted the tutor's CV for approval.

NEBOSH's requirement is for tutors delivering this qualification to have reached a minimum standard of English *equivalent* to an International English Language Testing System score of **7.0** or higher in IELTS tests.

5. Syllabus - NEBOSH International Diploma in Occupational Health and Safety (November 2015 specification)

Structure

The qualification is divided into four units. Units IA, IB and IC are further divided into ten elements; Unit DNI has one element.

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. The standards can be found at <http://nos.ukces.org.uk/Pages/index.aspx>.

Unit IA: Managing health and safety

Element number	Element title	Recommended tuition hours	Relevant Proskills units	Page number
1	Principles of health and safety management	6	PROHSP1, 3, 11, 12, 13, 16	18
2	Regulating health and safety	18	PROHSP12	20
3	Loss causation and incident investigation	6	PROHSP8	22
4	Measuring and reviewing health and safety performance	9	PROHSP6, 7, 8, 11,	24
5	Assessment and evaluation of risk	11	PROHSP4, 6, 8	26
6	Risk control	8	PROHSP6, 8	28
7	Organisational factors	14	PROHSP1, 2, 4, 14, 15	30
8	Human factors	10	PROHSP2, 5, 6, 14	33
9	The role of the health and safety practitioner	6	PROHSP1, 2, 4, 5, 6, 12, 13, 14	35
	Total taught hours	88		
	Total self-study hours	68		

Unit IB: Hazardous substances / agents

Element number	Element title	Recommended tuition hours	Relevant Proskills units	Page number
1	Managing occupational health	7	PROHSP6, 7, 8	39
2	Identification, assessment and evaluation of hazardous substances	8	PROHSP6, 8	41
3	Control of hazardous substances	7	PROHSP6	44
4	Monitoring and measuring of hazardous substances	6	PROHSP6, 7, 8	47
5	Biological agents	5	PROHSP6	49
6	Noise and vibration	10	PROHSP6, 7, 8	51
7	Radiation	6	PROHSP6, 7, 8	54
8	Mental ill-health and dealing with violence and aggression at work	6	PROHSP6, 8	57
9	Musculoskeletal risks and controls	5	PROHSP6	59
10	Work environment risks and controls	5	PROHSP6, 7, 8, 10	61
	Total taught hours	65		
	Total self-study hours	50		

Unit IC: Workplace and work equipment safety

Element number	Element title	Recommended tuition hours	Relevant Proskills units	Page number
1	Workplace welfare requirements and specific workplace issues	7	PROHSP6	67
2	Fires and explosions	5	PROHSP6	69
3	Workplace fire risk assessment	6	PROHSP6	71
4	Storage, handling and processing of hazardous substances	7	PROHSP6, 10	73
5	Work equipment	9	PROHSP5, 6	75
6	Workplace machinery	9	PROHSP6	77
7	Mobile, lifting, access and work at height equipment	6	PROHSP6	79
8	Electrical safety	7	PROHSP5, 6	81
9	Construction and works of a temporary nature – hazards and controls	8	PROHSP6	83
10	Workplace transport and managing work-related road risk	6	PROHSP6, 11 12	85
	Total taught hours	70		
	Total self-study hours	50		

Unit DNI: Application of health and safety management in the workplace

Element number	Element title	Recommended tuition hours	Relevant Proskills units	Page number
1	N/A	5	PROHSP1, 3, 4, 5, 6, 8, 9, 11, 13	91
	Total taught hours	5		
	Total self-study hours	72		
	Qualification taught hours	228		
	Qualification self-study hours	240		
	Overall hours	468		

5.1 Unit IA: Managing health and safety

Aim of the unit

This unit provides students with a thorough grounding in all major aspects of managing health and safety. It aims to prepare students for a career in health and safety by providing them with the ability to apply their knowledge and understanding of health and safety management issues in the workplace. In addition this knowledge and understanding prepares students for the written question paper assessment in Unit IA and the practical application (Unit DNI) which will be carried out in their own workplace.

Element IA1: Principles of health and safety management

Learning outcomes

- IA1.1 Explain the moral, legal and economic reasons for the effective management of health and safety
- IA1.2 Outline the societal factors which influence an organisation's health and safety standards and priorities
- IA1.3 Outline the uses of, and the reasons for, introducing a health and safety management system
- IA1.4 Explain the principles and content of an effective health and safety management system including the reasons for integration with other management systems.

Content

IA1.1 Reasons for the effective management of health and safety

- Moral:
 - the concept of reasonable care
 - the unacceptability of putting the health and safety of people at risk
 - society's attitude to moral obligations
 - accident/incident and ill-health statistics
 - the effect of size of organisation on accident/incident rates
- Legal:
 - preventive
 - punitive
 - the compensatory effects of law
 - the principle of self-regulation
- Economic:
 - the costs associated with accidents/incidents and ill-health and their impact on society and on organisations
 - the insured and un-insured costs
 - the financial benefits of effective health and safety management.

IA1.2 Societal factors which influence an organisation's health and safety standards and priorities

- Factors:
 - economic climate, government policy and initiatives
 - industry/business risk profile
 - globalisation of business
 - migrant workers
 - level of sickness absence
 - societal expectations of equality ie, adjustments for workers with disabilities.

IA1.3 The uses of, and the reasons for introducing a health and safety management system

- What is a management system
 - application of the plan, do, check, act cycle to an organisation's health and safety management (with reference to the UK HSE's '*Managing for health and safety (HSG65)*')
- The reasons for the introduction of health and safety management systems.

IA1.4 Principles and content of effective health and safety management systems

- Health and safety policy
 - the role of the health and safety policy in relation to a health and safety management system and as a vehicle for the communication of health and safety information
 - the requirements for a written health and safety policy and for recording arrangements in relevant standards
 - the general principles and objectives of a health and safety policy document
- The key elements/components of a health and safety management system:
 - ILO-OSH-2001 Guidelines on Occupational Health and Safety Management Systems. ILO, 2001
 - OHSAS 18001:2007 (Occupational Health and Safety Management Systems)
- The benefits and limitations of integration of quality, environmental, and health and safety management systems.

Recommended tuition time not less than 6 hours

Element IA2: Regulating health and safety

Learning outcomes

- IA2.1 Describe comparative governmental socio-legal and regulatory models
- IA2.2 Outline the purpose of enforcement and laws of contract
- IA2.3 Explain the role and limitations of the International Labour Organisation in a global health and safety setting
- IA2.4 Explain the role non-governmental bodies and self-regulation has in securing common health and safety standards in a global economy.

Content

IA2.1 Comparative governmental and socio-legal models

- The role, function and limitations of legislation as a means of promoting positive health and safety outcomes
- The nature, benefits and limitations of ‘goal-setting’ and ‘prescriptive’ legal models:
 - legal hierarchy of state and federal laws and their application to health and safety law
- Loss events in terms of failures in the duty of care to protect individuals and the compensatory mechanisms that may be available to them
 - compensatory schemes that allow individuals to seek restitution for damages ie, no fault liability and fault liability claims
 - punitive damages – general, special and non-economic damages.

IA2.2 The purpose of enforcement and laws of contract

- The purpose of enforcement
- The principles of enforcement with reference to the UK HSE’s ‘*Enforcement policy statement*’ (HSE41):
 - proportionality of enforcement
 - consistency of approach
 - transparency
- Laws of contract:
 - definition of contract to include the terms written, verbal, express and implied
 - the principles of typical laws of contract and their application to health and safety; the relationships between producer and vendor, vendor and consumer, client and contractor, contracts of employment and the binding nature of contracts.

IA2.3 The role and limitations of the International Labour Organisation in a global health and safety setting

- The role of the United Nations including:
 - the role of the International Labour Organisation (ILO) and International Labour Conference
 - Status of ILO conventions and recommendations

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- The roles and responsibilities of 'International governments', 'enterprises' and 'workers' as given in C155 Occupational Health and Safety Convention 1981 and in the publication R164 Occupational Safety and Health Recommendation, 1981
- How International conventions can be used as a basis for setting International systems of health and safety legislation ie, Occupational Safety and Health Convention and Recommendation (C155 and R164 respectively) and Promotional Framework for Occupational Safety and Health, 2006 Convention and Recommendation (C187 and R197 respectively).

IA2.4 The role of non-governmental bodies and health and safety standards

- Examples of relevant influential parties (employer bodies; trade associations; trade unions; professional groups (eg, IOSH, ASSE, Board of Certified Safety Professionals); pressure groups, public etc, and their role in influencing health and safety performance
- The importance of print, broadcast and social media in a global economy and their role in changing attitudes to health and safety
- The benefits of schemes which promote co-operation on health and safety between different companies eg, supplier auditing, good neighbour schemes
- The possible adverse effects on a business's reputation due to stakeholder reaction to health or safety concerns
- An organisation's moral obligations to raise standards of health and safety within their supply chains
- The meaning of 'self-regulation' and the role and function of corporate governance in a system of self-regulation
- How internal rules and procedures regulate health and safety performance.

Recommended tuition time not less than 16 hours

Element IA3: Loss causation and incident investigation

Learning outcomes

- IA3.1 Outline theories/models and use of loss causation techniques
- IA3.2 Explain the use of quantitative methods in analysing loss data
- IA3.3 Explain the significance and use of statutory and internal reporting of loss events
- IA3.4 Explain the reasons for loss and near miss investigations and the procedures to be followed.

Content

IA3.1 Theories/models and use of loss causation techniques

- Understand the following theories/models:
 - accident/incident ratio studies, understanding their use and their limitations
 - Birds domino and multi-causality theories (immediate, underlying and root causes)
 - latent and active failures: purpose of Reason's model of accident causation (swiss Cheese Model), fault tree, event tree and the Bowtie model
 - behavioural root cause analysis.

IA3.2 The 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
- Presenting and interpreting loss event data in graphical and numerical format, using examples of histograms, pie charts and line graphs
- The principles of statistical variability, validity and the use of distributions (ie, importance of representative samples, sampling a population, errors in data).

IA3.3 Reporting and recording of loss events (injuries, ill-health and dangerous occurrences) and near misses

- Reporting requirements and procedures; with reference to the ILO Code of Practice: Recording and Notification of Occupational Accidents and Diseases (1996)
- The significance of internal reporting and recording systems.

IA3.4 Loss and near miss investigations

- Implied legal requirements
- The reasons for carrying out investigations:
 - legal reasons
 - information/data gathering
 - establishing the root, underlying and immediate causes
- The benefits of carrying out an investigation
 - to prevent recurrence

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- improved employee morale
- developing managerial skills
- Investigation procedure with reference to '*Investigating accidents and incidents - a workbook for employers, unions, safety representatives and safety professionals (HSG245)*':
 - initial report (preserve the scene, note people and equipment involved, report event)
 - decide whether further investigation is required
 - gather information
 - analyse the information
 - identifying risk control measures
 - produce and implement an action plan
- Sharing of information/lessons learned to prevent recurrence.

Recommended tuition time not less than 6 hours

Element IA4: Measuring and reviewing health and safety performance

Learning outcomes

- IA4.1 Explain the purpose and use of performance measurement in relation to health and safety objectives and arrangements
- IA4.2 Explain the need for, and the objectives and limitations of, health and safety monitoring
- IA4.3 Describe the variety of health and safety monitoring and measurement techniques
- IA4.4 Explain the need for and process of reviewing health and safety performance.

Content

IA4.1 The purpose and use of health and safety performance measurement

- The meaning of health and safety performance measurement
- The need for a range of both active and reactive measures to determine whether health and safety objectives have been met
- The meaning of key performance indicators and their role in setting of business objectives
- The types of and benefits and limitations of leading and lagging indicators
- The assessment of the effectiveness and appropriateness of health and safety objectives and arrangements, including control measures
- Making recommendations, based on performance, for review of current health and safety management systems.

IA4.2 Health and safety monitoring

- The 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
- The objectives of reactive monitoring – to analyse data relating to accidents, ill-health and other loss causing events
- The limitations of reliance on accident/incident and ill-health data
- The distinction between, and applicability of, active/reactive, objective/subjective and qualitative/quantitative performance measures.

IA4.3 Health and safety monitoring and measurement techniques

- The range of measures available to evaluate the health and safety performance of an organisation and how these measures can be utilised to review the effectiveness of the health and safety management system
- Collecting and using sickness absence and ill-health data to develop occupational policy, strategy and targets

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- The role, purpose and key elements of health and safety audits, workplace inspections, safety tours, safety sampling, safety surveys, safety conversations and behavioural observations
- The in-house health and safety practitioner's role in audits carried out by external/third parties eg, during a certification audit
- Comparison of previous performance data with that of similar organisations/industry sectors and with national performance data. Use and potential benefits of benchmarking.

IA4.4 Reviewing health and safety performance

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

Recommended tuition time not less than 9 hours

Element IA5: The assessment and evaluation of risk

Learning outcomes

- IA5.1 Explain how to use internal and external information sources in identifying hazards and the assessing of risk
- IA5.2 Outline the use of a range of hazard identification techniques
- IA5.3 Explain how to assess and evaluate risk and to implement a risk assessment programme
- IA5.4 Explain the analysis, assessment and improvement of system failures and system reliability with the use of calculations
- IA5.5 Explain the principles and techniques of failure tracing methodologies with the use of calculations.

Content

IA5.1 Sources of information used in identifying hazards and assessing risk

- Accident/incident and ill-health data and rates – incidence, frequency, severity, prevalence
- External information sources (eg, relevant governmental agencies (OSHA/HSE), 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
- The uses and limitations of external and internal information sources.

IA5.2 Hazard identification techniques

- Using observation, task analysis and checklists and failure tracing techniques such as hazard and operability studies
- The importance of worker input.

IA5.3 Assessment and evaluation of risk

- Key steps in a risk assessment process including:
 - ensuring comprehensive identification of risks
 - identifying hazards
 - identifying persons at risk
 - the factors affecting probability and severity
 - risk evaluation and required risk control standards
 - formulating actions
 - prioritising actions
 - requirement to record findings
- Use and limitations of generic, specific and dynamic risk assessments
- Limitations of risk assessment processes
- Temporary and non-routine situations

- Consideration of long-term hazards to health
- Principles of and differences between 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
- The use of risk assessment in the development of safe systems of work and safe operating procedures
- Acceptability/tolerability of risk.

IA5.4 Systems failures and system reliability

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

IA5.5 Failure tracing methodologies

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

Recommended tuition time not less than 11 hours

Element IA6: Risk control

Learning outcomes

- IA6.1 Explain the use of common risk management strategies
- IA6.2 Outline factors to be taken into account when selecting risk controls
- IA6.3 Explain the development, main features and operation of safe systems of work and permit-to-work systems.

Content

IA6.1 Common risk management strategies

- The concepts of avoidance, reduction, transfer and retention with/without knowledge within a health and safety management system with relevant examples (eg, redesign of tasks, automation of process, insurance policies, use of specialist contractors)
- Circumstances when each of the above strategies would be appropriate
- Factors to be considered in the selection of an optimum solution based on relevant risk data
- The principles and benefits of risk management in a global perspective
- The link between the outcomes of risk assessments and the development of risk controls.

IA6.2 Factors to be taken into account when selecting risk controls

- Preventative and protective measures (with reference to ILO OSH 2001)
- Determine the technical/procedural/behavioural control measures required using the general hierarchy of control (with reference to OHSAS 18001):
 - elimination (technical)
 - substitution (technical / procedural)
 - engineering controls (technical / behavioural)
 - signage/warnings and/or administrative controls (procedural / behavioural)
 - personal protective equipment (technical / behavioural)

(Note: technical to include design, fencing, ventilation etc; procedural to include safe systems of work, permit-to-work, maintenance regime etc; behavioural to include information and training)
- Factors affecting the choice of control measures – long term/short term, applicability, practicability, cost, proportionality, effectiveness of control, legal requirements and associated standards, the competence of workers and training needs relevant to preferred controls.

IA6.3 Safe systems of work and permit-to-work systems

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

Recommended tuition time not less than 8 hours

Element IA7: Organisational factors

Learning outcomes

- IA7.1 Explain the types of health and safety leadership, their advantages; disadvantages and likely impact on safety performance
- IA7.2 Explain the organisational benefits of effective health and safety leadership
- IA7.3 Explain the internal and external influences on health and safety in an organisation
- IA7.4 Outline the different types of organisation, their structure, function and the concept of the organisation as a system
- IA7.5 Explain the requirements for managing third parties in the workplace
- IA7.6 Explain the role, influences on and procedures for formal and informal consultation with workers in the workplace
- IA7.7 Explain health and safety culture and climate
- IA7.8 Outline the factors which can both positively and negatively affect health and safety culture and climate.

Content

IA7.1 Types of safety leadership and their likely impact on health and safety performance

- The meaning of safety leadership
- Types of safety leadership, their advantages, disadvantages and likely impact on safety performance:
 - transformational
 - transactional
 - servant
 - situational and contextual (Hersey and Blanchard)
- Behavioural attributes of an effective leader.

IA7.2 Benefits of effective health and safety leadership

- Leadership as a core element of effective health and safety management
- Benefits of effective safety leadership on the health and safety culture and performance of an organisation
- The link between effective leadership and employee engagement
- The role of both an organisation and a health and safety practitioner in encouraging positive leadership and supporting managers at all levels to exhibit commitment to a safe and healthy workplace
- Influence of corporate social responsibility and business ethics on health and safety management.

IA7.3 Internal and external influences

- The internal influences on health and safety within an organisation eg, finance, production targets, trade unions/labour unions, organisational goals and culture
- The external influences on health and safety within an organisation eg, legislation, enforcement agencies, courts/tribunals, contracts, clients/contractors, trade unions, insurance companies, public opinion.

IA7.4 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, hierarchical vs flat management structures
- Potential conflict between organisational goals and the goals of the individual
- The integration of the goals of the organisation with the needs of the individual – authority, responsibility, accountability.

IA7.5 Third party control

- Identifying third parties: contractors, agency workers other employers (shared premises)
- Reasons for ensuring that third parties are covered by health and safety management systems
- Basic duties owed to and by third parties
- Internal rules and procedures concerned with the selection, appointment and control of contractors
- Responsibilities for control of risk associated with contractors and visitors
- Reasons for providing information relating to hazards/risks to third parties
- Review of contractor performance.

IA7.6 Consultation with workers

- The role of consultation within the workplace with reference to principles laid down in ILO Occupational Safety and Health Convention (C155), Article 20 and ILO Occupational Safety and Health Recommendation (R164)
- Formal consultation:
 - functions of worker representatives on health and safety
 - functions of a safety committee
 - formal consultation directly with workers
- Informal consultation:
 - discussion groups, safety circles, departmental meetings, worker discussion, email and web-based forums
- Behavioural aspects associated with consultation – peer group pressures, danger of tokenism, potential areas of conflict
- The role of the health and safety practitioner in the consultative process.

IA7.7 Health and safety culture and climate

- The meaning of 'health and safety culture' and 'health and safety climate'
- The influence of health and safety culture on behaviour and the effect of peer group pressure and norms
- The impact of organisational cultural factors and associated values on individual behaviour
- Indicators of culture
- The correlation between health and safety culture/climate and health and safety performance; the subjective and objective nature of culture and climate
- The measurement of the health and safety culture and climate (ie, safety climate assessment tools, perception surveys, findings of accident/incident investigations, effectiveness of communication, evidence of commitment by workers at all levels in the organisation).

IA7.8 Factors affecting health and safety culture and climate

- Factors that may promote a positive health and safety culture or climate (eg, management commitment and leadership, high business profile of 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 or climate (eg, organisational change, lack of confidence in organisation's objectives and methods, uncertainty, management decisions that prejudice mutual trust or lead to confusion regarding commitment)
- Effecting change: planning and communication, strong leadership, the need for a gradualist (step-by-step) approach, direct and indirect action to promote change (including cultural benefits from risk assessment), strong worker engagement, training and performance measurements and the importance of feedback
- Problems and pitfalls (ie, attempts to change culture too rapidly, adopting too broad an approach, absence of trust in communications, resistance to change).

Recommended tuition time not less than 14 hours

Element IA8: Human factors

Learning outcomes

- IA8.1 Outline psychological and sociological factors which may give rise to specific patterns of safe and unsafe behaviour in the working environment
- IA8.2 Explain the nature of the perception of risk and its relationship to performance in the workplace
- IA8.3 Explain the classification of human failure
- IA8.4 Explain appropriate methods of improving individual human reliability in the workplace
- IA8.5 Explain how organisational factors can contribute to improving human reliability
- IA8.6 Explain how job factors can contribute to improving human reliability
- IA8.7 Outline the principles, conditions and typical content of behavioural change programmes designed to improve safe behaviour in the workplace.

Content

IA8.1 Human psychology, sociology and behaviour

- The meaning of the terms psychology and sociology
- The influence of personality, attitude, aptitude and motivation on human behaviour
- Key theories of human motivation: Mayo (Hawthorne experiments), Maslow (hierarchy of needs), Vroom, Blanchard and their relevance to health and safety
- Effects of experience, social and cultural background, education and training on behaviour at work.

IA8.2 Perception of risk

- Human sensory receptors and their reaction to stimuli, sensory defects and basic screening techniques
- The 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.

IA8.3 Human failure classification

- HSG48 classification of human failure
- Cognitive processing; knowledge-based, rule-based and skill-based behaviour (Rasmussen)
- Contribution of human failure to serious incidents.

IA8.4 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
- Health surveillance; support for ill-health including mental health problems.

IA8.5 Organisational factors

- The effect of weaknesses in the health and 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 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.

IA8.6 Job factors

- The effect of job factors on the probability of human error (eg, task complexity, patterns of employment, payment systems, shift work)
- The application of task analysis in predicting the probability and prevention of error
- The role of ergonomics in job design:
 - the influence of process and equipment design on human reliability
 - the worker 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 ie, 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 under-stimulation, fatigue and stress on human reliability.

IA8.7 Behavioural change programmes

- The principles of behavioural change programmes
- The organisational conditions needed for success in behavioural change programmes
- Examples of the content of typical behavioural change programmes.

Recommended tuition time not less than 10 hours

Element IA9: The role of the health and safety practitioner

Note to tutors: Element IA9 does not have to be taught as part of Unit IA, as it will be assessed only as part of the Unit DNI assessment.

Learning outcomes

- IA9.1 Explain the role of the health and safety practitioner
- IA9.2 Explain the importance of effective communication and negotiation skills when promoting health and safety
- IA9.3 Outline how health and safety practitioners can use financial justification to aid decision making.

Content

IA9.1 The role of the health and safety practitioner

- The role of the health and safety practitioner and the potential conflicts that this role brings ie, who the practitioner is there to protect; employees, employers or third parties
- The meaning of the term 'competence' and the importance of a health and safety practitioner recognising the limits of their own competence
- The need for health and safety practitioners to evaluate and develop their own practice so as to maintain competence
- The role of the health and safety practitioner in mentoring and supporting the development of health and safety competency in other relevant employees
- The distinction between leadership and management and how this can apply to a health and safety practitioner
- The need to adopt to different management styles dependent on any given situation
- The role of health and safety practitioners in the development, implementation, maintenance and evaluation of health and safety management systems
- Sensible risk management including the importance of proportionality when assessing and controlling risk
- The health and safety practitioner's role in enabling work activities as part of proportionate and sensible risk management
- Organisational risk profiling; its purpose, practicality and organisational context
- The contribution of the health and safety practitioner in achieving the objectives of an organisation
- The meaning of the term 'ethics'
- The practical application of ethical principles (ie, honesty, respect, integrity, personal conflicts of interest) that underpin professional health and safety practitioner codes of conduct.

IA9.2 The importance of effective communication and negotiations skills when promoting health and safety

- Why effective communication is important
- The need for health and safety practitioners to consult and negotiate with others when developing an organisation's health and safety objectives
- Influencing ownership of health and safety at all levels of an organisation via:
 - participation
 - management accountability
 - consultation
 - feedback
- The importance of receiving, and acting on feedback from all stakeholders on health and safety performance
- The use of different methods of communication media available to promote the health and safety message ie, verbal, electronic, printed, pictorial and social
- Procedures for resolving conflict and introducing change
- Ensuring roles and responsibilities are clear, understood by all workers and implemented.

IA9.3 The Health and safety practitioner's use of financial justification to aid decision making

- The significance of budgetary responsibility, including profit, loss and payback analysis
- Importance of recognising who is the responsible budget holder and how they can be influenced to make appropriate health and safety decisions
- Cost-benefit analysis in relation to risk control decisions (organisational, design, planning, operational)
- The internal and external sources of information that should be considered when determining costs
- The necessity of both short and long term budgetary planning when seeking approval for new initiatives, projects and campaigns.

Recommended tuition time not less than 6 hours

Unit IA: Tutor References

Health and safety incidents

(reference to Element 9.3)

Union Carbide, Bhopal <http://www.bhopal.com/>

Buncefield [Link to Buncefield Report](#)

Piper Alpha [Link to Learning from the Piper Alpha Accident](#)

Seveso [Link to Seveso accident summary](#)

Texas City [Link to Texas City guidance](#)

Three Mile Island [Link to Three Mile Island accident details](#)

International statutory instruments (Directives, Conventions, Recommendations and Protocols)

Reference title	Reference detail eg link to Convention	Element/s
List of Occupational Diseases Recommendation, 2002 (No 194)	Link to R194	3
Protocol of 2002 to the Occupational Safety and Health Convention, 1981 (P155)	Link to P155	3
Occupational Health Services Convention, 1985, ILO AND Recommendation, 2006 (No. 197)	Link to C161 Link to R197	1, 2, 3
Occupational Safety and Health Convention (C155) and Recommendation (R164)	Link to C155 Link to R164	1, 2, 3, 6, 7
Promotional Framework for Occupational Safety and Health, 2006, ILO (C187) and Recommendation (R197)	Link to C187 Link to R197	1, 2
Prevention of Major Industrial Accidents Convention, ILO, C174 and Recommendation R181	Link to C174 Link to R181	5

Other relevant international references

Reference title	Reference detail eg ISBN number	Element/s
Ambient factors in the Workplace, International Labour Organisation (ILO) Code of Practice (CoP)	ISBN 92-2-11628-X Link to Ambient Factors	6
Bird F E, 1974. Management guide to Loss Control, Institute Press, Atlanta, Georgia, USA		3
Encyclopaedia of Occupational Health and Safety, ILO	Chapter 59, Safety Policy and Leadership Link to ILO Encyclopaedia	1, 7
Guidelines for auditing management systems, BS EN ISO 19011:2011	ISBN: 978-0-5807-7524-6	4
Guidelines on occupational safety and health management systems (ILO-OSH 2001)	Link to ILO OSH 2001	1, 6

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Reference title	Reference detail eg ISBN number	Element/s
Hersey-Blanchard Situational Leadership Theory	Link to Hersey-Blanchard	7
Occupational health and safety management systems – requirements (OHSAS 18000 series) ¹	OHSAS 18001 ISBN: 978-0-5805-9404-5 OHSAS 18002 ISBN: 978-0-5806-2686-9	1, 7, 8
Prevention of major industrial accidents, ILO, Code of Practice	ISBN: 92-2-107101-4 Link to Prevention of major industrial accidents CoP	6
Reason J (1997) 'Managing the Risks of Organisational Accidents'		4
Recording and notification of occupational accidents and diseases, ILO Code of Practice	Link to Recording accidents document	4
Training Package on workplace risk assessment and management for small and medium-sized enterprises, ILO Guidance	ISBN: 978-92-2-127065-2 Link to workplace risk assessment document	6, 7

¹This reference will be updated once the revised ISO 45001 standard is published.

Other relevant UK references

Reference title	Reference detail eg ISBN number	Element/s
Bird F E, 1974. Management guide to Loss Control, Institute Press, Atlanta, Georgia, USA		4
Controlling the risks in the workplace	Link to the HSE's controlling risks	7
Enforcement Policy Statement, HSE41	HSE Link to HSE41	2
Guidance on permit-to-work systems. A guide for the petroleum, chemical and allied industries, HSG250	HSE Books, ISBN: 978-0-7176-2943-5 Link to HSG250	7
Guidelines for auditing management systems, BS EN ISO 19011:2011	ISBN: 978-0-5807-7524-6	5
IIRSM Code of Ethics	Link to IIRSM Code of Ethics	3, 9
IOSH Code of Conduct	Link to IOSH Code of Conduct	3, 9
Investigating accidents and incidents – a workbook for employers, unions, safety representatives and safety professionals, HSG245	HSE Books, Link to HSG245	4
Leading health and safety at work, INDG417	IOD and HSE publication, HSE Books, Link to INDG417	3, 8, 9
Reducing error and influencing behaviour, HSG48	HSE Books, ISBN: 978-0-7176-2452-2 Link to HSG48	9
Reducing risks, protecting people, R2P2	HSE books, ISBN: 978-0-7176-2151-0 Link to R2P2	6
Risk assessment, A brief guide to controlling risks in the workplace, INDG163	HSE Books, Link to INDG163	6, 7

5.2 Unit IB: Hazardous substances / agents

Aim of the unit

This unit provides students with a thorough grounding in all major aspects of managing hazardous substances and agents. It aims to prepare students for a career in health and safety by providing them with the ability to apply their knowledge and understanding of hazardous substances / agents in the workplace. In addition this knowledge and understanding prepares students for the written question paper assessment in Unit IB and the practical application (Unit DNI) which will be carried out in their own workplace.

Element IB1: Managing occupational health

Learning outcomes

- IB1.1 Outline the nature of occupational health
- IB1.2 Outline the principles and benefits of vocational rehabilitation including the role of outside support agencies
- IB1.3 Outline the management of occupational health (including the practical and legal aspects).

Content

IB1.1 Nature of occupational health

- The meaning of health (with reference to definition used by the World Health Organisation)
- The meaning of occupational health (with reference to definition used by the International Labour Organisation)
- The meaning of well-being (with reference to the definition used by the Economic and Social Research Council (ESRC))
- The 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 of information
- The links between occupational health and general/public health, including arrangements to deal with epidemics.

IB1.2 The principles and benefits of vocational rehabilitation

- The basic principles of the bio-psycho-social model and how it relates to the health of individuals
- The principles of fitness to work and fitness to work standards
- The role and benefits of 'pre-placement assessment
- Managing long-term and short-term frequent sickness absence/incapacity for work (with reference to PH19 – NICE)
- The meaning of vocational rehabilitation

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- The benefits of vocational rehabilitation within the context of the employee and the employer
- Overcoming any barriers to ensure that rehabilitation of the individual is effective
- The need to undertake or review risk assessments prior to return to work
- Liaison with other disciplines in assessing and managing fitness for work with specific reference to; existing health problems, fitness to work standards, discrimination
- The role of agencies that can support the employers and employees.

IB1.3 Managing occupational health

- The role, function and benefits of occupational health services
- The make-up and roles of a typical occupational health service and the importance of determining competency: occupational health physician, occupational health nurse, occupational health adviser, 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
- The benefits of health needs assessment in relation to the planning of occupational health services
- The importance of auditing against standards in occupational health provision with specific reference to SEQOHS.

Recommended tuition time not less than 7 hours

Element IB2: Identification, assessment and evaluation of hazardous substances

Learning outcomes

- IB2.1 Explain the main routes of entry and the human body's defensive responses to hazardous substances
- IB2.2 Explain the identification, classification and health effects of hazardous substances used in the workplace
- IB2.3 Outline the factors to consider when undertaking assessment and evaluation of risks from hazardous substances
- IB2.4 Outline the role of epidemiology and toxicological testing.

Content

IB2.1 The human anatomical system – the routes of entry and defensive responses

- The structure and function of human anatomical systems: respiratory, digestive, circulatory, nervous system and the special sensory organs (skin, eyes and nose)
- The main routes (eyes, nose, mouth, skin) and methods of entry (inhalation, ingestion, skin pervasion, injection, aspiration) of hazardous substances into the human body
- The concepts of target organs and target systems in relation to attack by hazardous substances; local and systemic effects
- The body's defensive responses (innate and adaptive), with particular reference to the respiratory system.

IB2.2 The identification, classification and health effects of hazardous substances used in the workplace

- The influence of physical form (dust, fibre, fume, gas, mist, vapour, liquid) and properties (ie, solubility) on routes of entry
- The distinction between inhalable and respirable dust
- The purpose of classification and the role of hazard and precautionary statements for hazardous substances with reference to the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) and the EC Regulation No 1272/2008 Classification, Labelling and Packaging of Substances and Mixtures (CLP)
- Health hazard classes (meaning of terms, with reference to chapter 3 of GHS) – acute toxicity, skin corrosion, skin irritation, serious eye damage, eye irritation, respiratory sensitisation, skin sensitisation, germ cell mutagenicity, carcinogenicity, reproductive toxicity, specific target organ toxicity (single and repeated exposure), aspiration hazard
- The purpose of the European Regulation Registration, Evaluation, Authorisation and restriction of Chemicals (REACH)

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- Hazardous substances: hazard class/es, route/s of entry, target organ/s and likely acute/chronic health effect/s:
 - Carbon Monoxide
 - Isocyanates
 - metal working fluids
 - used engine oil
 - Silica
 - wood dusts (hard and soft wood)
 - asbestos
 - lead
- Attempts at developing internationally accepted reviews of effects of hazardous substances on human health to aid harmonisation of classifications and risk estimation. eg, Concise International Chemical Assessment Documents from the International Programme on Chemical Safety (IPCS) (WHO/ILO/UNEP).

IB2.3 The assessment and evaluation of risk from hazardous substances

- Information on substances or preparations/mixtures which have the potential to cause harm to be communicated to users: the typical content (format and types of data) of labels; Safety Data Sheets; Chemical Safety Assessments/Reports
- The factors to be considered in the assessment of risks to health from hazardous substances:
 - the hazardous properties of the substance, including health effects and the likely routes of exposure (eg, 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)
 - the effect of mixtures (antagonism eg, poison vs antidote, additivity and potentiation/synergy)
 - the quantity (amounts/concentration) in use ie, level of exposure
 - the operating conditions and processes used (eg, nature of the task, methods used, high temperature)
 - the range of uses of the chemicals (eg, production, handling)
 - the number of people exposed
 - the type and duration of exposure
 - the frequency of exposure
 - the variety and nature of tasks and the methods used (especially where exposure is likely to be unusually high (eg, maintenance, cleaning and accidental release)
 - the thresholds of exposure (the amount needed to cause harm)
 - the consequences and likelihood of failure of existing control measures
 - the results from relevant health surveillance and exposure monitoring
 - individual susceptibilities (eg, atopic persons, women of child bearing capacity, age, sensitisation)
- Review of risk assessment – to take place when there is reason to suspect it is no longer valid or where significant change to the work to which the assessment relates has occurred.

IB2.4 The role of epidemiology and toxicological testing

- Human epidemiological investigations: the role of case control studies and cohort studies (retrospective and prospective)
- The role of toxicological testing: vertebrate animal testing, Ames test, Qualitative/Quantitative Structure Activity Relationship (QSAR), 'read across' and grouping
- The meaning of dose-response relationship, NOAEL, LD50, LC50.

Recommended tuition time not less than 8 hours

Element IB3: The control of hazardous substances

Learning outcomes

- IB3.1 Explain the principles of prevention and control of exposure to hazardous substances (including carcinogens and mutagens)
- IB3.2 Outline the specific requirements for working with asbestos and lead
- IB3.3 Explain the uses and limitations of dilution ventilation and the purpose and operation of local exhaust ventilation, including assessing and maintaining effectiveness
- IB3.4 Explain the effectiveness of various types of personal protective equipment (PPE) and the factors to consider in selection of PPE.

Content

IB3.1 The prevention and control of exposure to hazardous substances (including carcinogens and mutagens)

- With reference to chapters 6.4 and 6.5 of ILO CoP, 'Safety in the Use of Chemicals at Work' and chapter 4.3 of ILO CoP 'Ambient Factors in the Workplace':
 - Elimination:
 - ceasing use
 - substitution for less hazardous chemical or use of the same chemical but in a different form (eg, paste, solution rather than dusty powder)
 - alternative process
 - control:
 - good design and installation practice (total enclosure; segregating the process from workers; modifying the process or work system so that it emits less of the hazardous substance (eg, painting vs spraying); local exhaust ventilation with or without partial enclosure (detail of extraction systems covered in element IB4); general ventilation)
 - work systems and practices (minimising the numbers of workers exposed; restricting access; reducing exposure duration; regular cleaning of contaminated surfaces; use/maintenance of engineering controls; safe/secure storage, internal transport and disposal)
 - personal protection (provide PPE; prohibit eating, drinking, smoking in contaminated areas; facilities for washing, changing, storage, laundering; signs and notices; emergency arrangements)
- 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.

IB3.2 The specific requirements for working with asbestos and lead

- Identification of types of asbestos
- Typical locations where asbestos can be found
- The control measures for the specific case of asbestos: ie, preventative methods, design and installation, LEV, personal protection, cleaning of premises and plant, disposal of asbestos waste
- Use of specialist contractors for removal and disposal of asbestos; checking the competence of specialist contractors
- Additional control measures for working with lead with typical workplace examples.

IB3.3 Ventilation

- The uses and limitations of dilution ventilation for hazardous substances
- Roles and responsibilities in relation to Local Exhaust Ventilation (LEV):
 - the LEV owner (employer, employee - process operator and routine checks)
 - the LEV supplier (designer and installer)
 - the LEV service provider (commissioner, maintenance engineer, examiner)
 - overlap of roles
 - competence requirements for each of the roles
 - effective communication between all roles
- The typical components of an LEV and their function: hood (enclosing, receiving, capturing), ducting, air cleaner/arrestor, air mover (engine/fan), discharge/exhaust
- Source strength (area from which the contaminant arises) and capture zones
- Thorough examinations of LEV
 - the need for routine checks
 - the requirements for examinations/inspections
 - the competence of those carrying out the testing
 - the frequency of testing
 - understanding the risks from the system
 - co-operation between employer and examiner
 - the sources of information available to the examiner
 - the equipment required for testing
 - the three stages to carrying out testing
 - report on LEV testing
 - the interpretation of results and implementing recommendations.

IB3.4 Personal protective equipment

- The types of PPE for use with hazardous substances
- Respiratory protective equipment (RPE):
 - the types of respirators and breathing apparatus and their applications and limitations
 - the selection of RPE:
 - atmosphere/substance-related factors: consideration of likely oxygen deficiency (ie, BA vs respirator); the level of protection required (significance of assigned protection factors); the type of filter required (for respirators)

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- task and work area related factors eg, work rate, duration; extremes of temperature and/or humidity; criticality of clear vision, communications and mobility; space constraints; tools used; presence of explosive atmospheres
- wearer-related factors e.g. fit/comfort/acceptability issues caused by beards, face-marking, spectacles, compatibility with other protective equipment or head coverings; medical conditions
- quality related factors - conformity with relevant standards
- face fit testing
- Skin and eye protection:
 - types of skin and eye protection and their applications and limitations
 - selection:
 - substance-related factors eg, chemical compatibility, level of protection required
 - task-related factors eg, duration (breakthrough time), choice between dexterity vs durability; choice of gloves vs gauntlets
 - wearer-related factors eg, fit/comfort, compatibility, acceptability
 - quality-related factors – conformity with relevant standards
- The storage and maintenance of PPE
- The need for training in the correct use of PPE.

Recommended tuition time not less than 7 hours

Element IB4: The monitoring and measuring of hazardous substances

Learning outcomes

- IB4.1 Explain how occupational exposure limits are used in the workplace
- IB4.2 Outline the methods for sampling of airborne contaminants
- IB4.3 Outline the principles of biological monitoring.

Content

IB4.1 Occupational exposure limits (OELs)

- The concept of exposure standards
- The meaning of Exposure Limits for airborne harmful substances
- The basis for setting exposure limits (with reference to section 3 of ILO CoP Occupational exposure to airborne substances harmful to health):
 - consideration of dose-response and dose-effect relationship in the light of data on: substance properties, the expected use and likely exposure scenarios, the results of animal experiments; the results of medical examinations of exposed workers; epidemiology etc
 - interpreting data and extrapolation to give exposure limits- considerations and application of safety factors
- The significance of short term and long term exposure limits (STEL, LTEL) and time-weighted average (TWA) values in occupational health and hygiene practice
- International examples of exposure limits (such as Threshold Limit Values (TLVs), Workplace Exposure Limits (WELs); Permissible Exposure Limits (PELs)) with reference to specific substances, including lead and asbestos.

IB4.2 Strategies, methods and equipment for the sampling and measurement of airborne contaminants

- The role of the occupational hygienist; the 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:
 - initial appraisal
 - basic survey
 - detailed survey
 - reappraisal
 - routine monitoring and factors that determine its necessity and frequency
 - the difference between static and personal monitoring
 - the importance of using standard methods (eg, MDHS series, NIOSH Manual of Analytical Methods series, ISO standards)
- Direct reading instruments (give immediate or near immediate reading); advantages and disadvantages; example of stain tube (colorimetric) detectors

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- General equipment and methodology for *personal* sampling of solid particulates (fibres; respirable and/or inhalable dusts):
 - sampling heads (IOM*, cowl, protected, cyclone)
 - pump (calibrated)
 - measurement principles: dusts (gravimetric, physical and chemical analysis), fibres (use of microscopy)
- General equipment and methodology for *personal* sampling of vapours:
 - active devices (eg, liquid or solid sorbents and pumps)
 - passive devices
 - measurement principles (chemical and physical analysis techniques such as spectroscopy and chromatography)
- The 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.

IB4.3 Biological monitoring

- The distinction between general health assessment and health surveillance
- The elements of the HSE health surveillance cycle (with reference to the HSE's health surveillance cycle)
- The requirements for keeping health records and medical records including issues of confidentiality, sharing of information with the individual and others
- Biological monitoring (a specific form of medical surveillance, with reference to section 4 of ILO CoP 'Occupational exposure to airborne substances harmful to health'):
 - the basic principles (with workplace examples)
 - the circumstances where it is especially applicable
 - the role of biological limits
 - the relative advantages and disadvantages when compared to airborne monitoring.

Recommended tuition time not less than 6 hours

* IOM – invented by the Institute of Occupational Medicine

Element IB5: Biological agents

Learning outcomes

- IB5.1 Explain the types and properties of biological agents found at work
- IB5.2 Explain the assessment and control of risk from deliberate and non-deliberate exposure to biological agents at work.

Content

IB5.1 Types and properties of biological agents

- The general meaning of 'biological agent' (eg, that used by ILO in Fact Sheet 3 of Manual 4 of Health, Safety and Environment – a series of trades union education manuals for agricultural workers)
- The main types of biological agent (fungi, bacteria, viruses, protozoa) and sources (human, animal and environmental); with examples in each case
- The special properties of biological agents (rapid mutation, incubation period, infectious, rapid multiplication)
- Zoonotic diseases/Vector-borne: occupational contexts, occurrence, symptoms, target organs and control:
 - Animal Influenza
 - Cryptosporidiosis
 - Malaria
 - Psittacosis
- Biological agents: occupational contexts, occurrence, symptoms, target organs and control:
 - Blood borne viruses: Hepatitis B, C, D and Human Immunodeficiency Virus (HIV)
 - Legionella
 - Leptospira
 - Norovirus.

IB5.2 The assessment and control of risk from exposure to deliberate and non-deliberate biological agents

- Distinction between deliberate work (eg, in laboratories) vs. non-deliberate infection (eg, farming, sewers, refuse collection)
- Factors to take into account in risk assessment:
 - biosafety levels
 - the criteria for categorisation
 - the pathogenicity of the agent and infectious dose
 - the activities and people at risk
 - the likelihood and nature of resultant disease
 - the modes of transmission with examples
 - the stability of the agent in the environment
 - the concentration and amounts
 - the presence of a suitable host (human or animal)
 - the data available (ie, animal studies)

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- the nature of activity (ie, aerosol formation, genetic manipulations)
- the local availability of prophylaxis/treatment
- The general hierarchy of control as applied to biological agents.

Recommended tuition time not less than 5 hours

Element IB6: Noise and vibration

Learning outcomes

- IB6.1 Explain the basic physical concepts relevant to noise
- IB6.2 Explain the effects of noise on the individual and the use of audiometry
- IB6.3 Explain the measurement and assessment of noise exposure
- IB6.4 Explain the principles and methods of controlling noise and noise exposure
- IB6.5 Explain the basic physical concepts relevant to vibration
- IB6.6 Explain the effects of vibration on the individual
- IB6.7 Explain the measurement and assessment of vibration exposure
- IB6.8 Explain the principles and methods of controlling vibration and vibration exposure.

Content

IB6.1 The basic physical concepts relevant to noise

- The general meaning of 'noise' (ref: article 3 of ILO C148, Working Environment Convention 1977)
- The basic concepts of sound:
 - nature (progressive longitudinal wave, transmitted through the displacement of the medium through which it travels)
 - wave properties - wavelength, amplitude, frequency/pitch
 - the concepts of sound pressure, sound intensity
 - the decibel (dB) scale and its logarithmic nature (with workplace examples at different sound levels)
 - human auditory frequency sensitivity and the significance of A-weighting 'dB(A)' and C weighting 'dB(C)', in relation to occupational noise exposure
- The concept of equivalent noise dose (LA_{eq} , $L_{EP,d}$, weekly and peak).

IB6.2 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 (ie, noise induced hearing loss, instantaneous hearing loss, temporary threshold shift, permanent threshold shift, Tinnitus)
- Health surveillance (ref: section 9.4 of ILO CoP, 'Ambient Factors in the Workplace'):
 - the circumstances when it may be required (pre-employment, periodic based on findings of workplace assessments, following complaints etc)
 - the use of audiometry to measure hearing and hearing loss; method, interpretation and the use of results (interpretation of audiograms), the advantages and disadvantages of audiometry programmes, including legal implications.

IB6.3 The measurement and assessment of noise exposure

- Noise risk assessment to consider (ref section 9.2, ILO CoP, 'Ambient Factors in the Workplace'):
 - the risk of hearing impairment, impairment of communications, fatigue
 - the identification of sources, tasks
 - the expected noise emission levels from equipment
 - the expected time of exposure
 - planning (who, how, where, how often)
 - the types of instrumentation
 - the importance of calibration
 - the types of measurements to be taken
 - the use of specialist noise consultants
 - the interpretation and evaluation of results
 - the use of noise calculators to determine mixed exposures (reference UK HSE's online calculator)
 - comparison with legal limits to make control decisions.

IB6.4 Controlling noise and noise exposure

- The hierarchy of noise control:
 - eliminate/control at source (substitution, damping, workplace layout (eg, relocation of all noisy equipment), re-design of equipment/task, maintenance, purchasing policy)
 - control along transmission path:
 - the behaviour of sound at interfaces – transmission, reflection, absorption
 - sound reduction indices and absorption coefficients and their use in materials selection
 - techniques of damping, isolation, diffusion, barriers, acoustic enclosures, distance
 - active noise cancellation
 - control exposure at the receiver (acoustic havens, hearing protection zones, and PPE, limiting exposure time, role of health surveillance (audiometry, referenced earlier)
- The selection, maintenance and use of appropriate hearing protection:
 - types of hearing protection
 - the use of octave band analysis to aid selection of hearing protection and other control measures
 - Single Number Rating (SNR) and HML (high, medium, low) methods
 - the problems of over-protection.

IB6.5 The basic physical concepts relevant to vibration

- The meaning of 'Vibration' (ref: article 3 of ILO C148, Working Environment Convention 1977)

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- The basic concepts of displacement, velocity, amplitude, frequency and acceleration for oscillating particles in relation to:
 - occupational vibration exposure, with examples of machinery and their typical emission levels
 - comfort levels
 - concept of equivalent vibration dose.

IB6.6 The effects of vibration on the individual

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

IB6.7 The measurement and assessment of vibration exposure

- Vibration risk assessment to consider (ref section 10.2, ILO CoP, 'Ambient Factors in the Workplace'):
 - the risk of ill-health
 - the results of health surveillance
 - the identification of sources, tasks
 - the expected vibration emission levels from equipment
 - the expected time of exposure
 - exposure to cold, nature of the vibration (WBV, HAV etc)
 - planning (who, how, where, how often)
 - instrumentation for carrying out vibration assessments
 - the importance of calibration
 - the types of measurements to be taken
 - the use of specialist consultants
 - the interpretation and evaluation of results
 - the use of vibration calculators to determine mixed exposures
 - comparison with legal limits to make control decisions.

IB6.8 Controlling vibration and vibration exposure

- Practical control measures to prevent or minimise exposure to both WBV and HAV, including:
 - automation
 - change of work method
 - improved/alternative equipment
 - purchasing policy
 - maintenance
 - job rotation
 - instruction/training
 - the use and limitations of PPE.

Recommended tuition time not less than 10 hours

Element IB7: Radiation

Learning outcomes

- IB7.1 Outline the nature of the different types of ionising and non-ionising radiation
- IB7.2 Explain the effects of exposure to non-ionising radiation, its measurement and control
- IB7.3 Outline the effects of exposure to ionising radiation, its measurement and control
- IB7.4 Outline the different sources of lasers found in the workplace, the classification of lasers and the control measures.

Content

IB7.1 The nature and different types of ionising and non-ionising radiation

- The distinction between ionising and non-ionising radiation
- The electromagnetic spectrum:
 - Gamma ray, X-ray, optical (ie, ultraviolet (UV), visible, infra-red (IR)) and radiofrequency (ie, microwaves, radio waves) with examples of origins and sources (occupational and natural)
 - electromagnetic (EM) wave properties - wavelength, frequency, energy
- Particulate radiation properties (alpha, beta, neutrons), with examples of origins and sources (occupational and natural)
- The role of the International Commission on Radiological Protection (ICRP) and the International Commission on Non-Ionising Radiation Protection (ICNIRP).

IB7.2 Non-ionising radiation

- Sources of non-ionising Radiation:
 - workplace examples: leisure industry, manufacturing, healthcare, research, telecommunications
 - naturally occurring (sunlight): indoor / outdoor work
- The routes and effects of exposure, both acute and chronic:
 - damage to eyes: early onset of cataract risk, photokeratitis and photoconjunctivitis ('arc eye'), photochemical damage to the retina (blue light hazard),
 - damage to skin – reddening of the skin (erythema), burns, skin cancer
- The concept of exposure values and limits with examples ie, Specific Absorption Rate values and limits

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- Radiation risk assessment to consider:
 - sources of non-ionising radiation
 - the comparison of measured exposure levels with exposure limits and values (where applicable)
 - the potential for misuse or misunderstanding of safety precautions
- The 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/beams
 - screening
 - enclosures
 - distance
 - safe systems of work
 - instructions
 - training
 - personal protective equipment.

IB7.3 Ionising radiation

- Sources of ionising radiation:
 - workplace examples: manufacturing, healthcare, research, power generation
 - naturally occurring: radon
- The units (mSv) and concepts of ionising radiation:
 - radioactivity, half-life, absorbed dose, equivalent dose, effective dose, dose rates
- The routes and effects of exposure to each type of ionising radiation (alpha, beta, gamma, x-rays, neutrons):
 - somatic (early/acute, late/chronic)
 - genetic
- The measurement and assessment of ionising radiation workers exposure:
 - the use of passive dosimeters: thermoluminescent dosimeters (TLDs) to measure whole body dose and extremity dose
 - the use of active dosimeters: personal alarm dosimeters
 - dose assessment and recording: approved dosimetry service, communicating information to classified persons, record keeping
- Practical measures to prevent or minimise exposure to:
 - external ionising radiation (shielding, distance, time)
 - internal ionising radiation (preventing inhalation, ingestion, entry through the skin including contaminated wounds and absorption through the skin)
- Radiation protection (with reference to chapters 3-7, International Labour Office, Radiation Protection of Workers (Ionising Radiations), an ILO Code of Practice).

IB7.4 Lasers

- Typical laser sources in workplaces (entertainment, retail, manufacturing, healthcare, research)
- Hazard classifications of lasers (British Standard BS EN 60825-1:2014), exposure limits
- The routes and effects of exposure to lasers:
 - damage to the eyes from laser beams/IPL (intense pulsed light) including blindness
 - damage to the skin – reddening of the skin (erythema) and burns
- The 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.

Recommended tuition time not less than 6 hours

Element IB8: Mental ill-health and dealing with violence and aggression at work

Learning outcomes

- IB8.1 Explain the effects and causes of common types of mental ill-health within the workplace
- IB8.2 Explain the identification and control of workplace mental ill-health with reference to relevant standards
- IB8.3 Explain the scope, effects and causes of work-related violence/aggression
- IB8.4 Explain the identification and control of work-related violence/aggression with reference to relevant standards.

Content

IB8.1 The extent, effects and causes of mental ill-health at work

- The prevalence of mental ill-health within the workplace with reference to reportable and self-reported sources of information
- The characteristics and causes of common types of mental ill-health observed within the workplace and their effects on an individual's health and behaviour:
 - depression
 - anxiety
- The meaning of work-related stress
- The causes of **work-related** mental ill-health 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: travel to/from work, childcare issues, relocation, etc.
- Recognition that common mental health problems found within the workplace are rarely entirely due to work-related factors, but are a combination of a number of stressors.

IB8.2 The identification and control of work-related mental ill-health

- Recognition that most people with mental health problems can continue to work effectively and how this can be facilitated / supported by employers
- The identification and assessment of work-related mental ill-health at individual and organisational level (eg, discussions, absence data, interviews, surveys, questionnaires, etc)
- Practical control measures to reduce and manage work-related stress (including counselling and return to work policies)

- The UK HSE's stress management standards and their role in assessing and managing work-related stress (demand, control, support, relationships, role, change).

IB8.3 The scope, effects and causes of work-related violence/aggression

- The meaning of work-related violence/aggression (with reference to section 1.3 of Workplace Violence in Services Sectors and Measures to Combat This Phenomenon, ILO Code of Practice and section 1.3 of ILO (and others) International Framework Guidelines for Addressing Workplace Violence in the Health Sector)
- The physical and psychological effects of violence and aggression
- The factors likely to increase the risk of work-related violence, eg, people working with the public, the caring/teaching professions, working with psychiatric clients or alcohol/drug impaired people, working alone, home visiting, handling money/valuables, inspection and enforcement duties, retail, licensed and illegal alcohol trade, cultural, ethnic and tribal issues.

IB8.4 The identification and control of work-related violence/aggression

- The identification and assessment of risks of work-related violence/aggression (ie, use of staff surveys, incident reporting and risk assessment)
- The identification of practical control measures to reduce and manage work-related violence/aggression including using physical, organisational and behavioural controls:
 - cash free systems, the layout of public areas and the design of fixtures and fittings
 - the layout of public areas and design of fixtures and fittings
 - the 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, the use of mobile communications equipment phones, radios, GPS
 - staff training: recognition of situations where violence could result, interpersonal skills to defuse aggression, the 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.

Recommended tuition time not less than 6 hours

Element IB9: Musculoskeletal risks and controls

Learning outcomes

- IB9.1 Outline types, causes and relevant workplace examples of injuries and ill-health conditions associated with repetitive physical activities, manual handling and poor posture
- IB9.2 Explain the assessment and control of risks from repetitive activities, manual handling and poor posture.

Content

IB9.1 The types, causes and examples of musculoskeletal injuries and ill-health

- Basic understanding of the human musculoskeletal system including: bones, tendons, ligaments, nerves and muscles
- The types of injury and ill-health conditions resulting from repetitive physical activities, manual handling and poor posture, including: Work-Related Upper Limb Disorders, 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 computers/laptops, manual handling of objects and people.

IB9.2 The assessment and control of risks from repetitive physical activities, manual handling and poor posture

- The principles of ergonomic design as applied to the control of musculoskeletal risks
- Consideration of: task, load, force, working environment, equipment, individual capability when assessing risks associated with repetitive physical activities, manual handling and poor posture
- The methods of assessing the risks associated with jobs/tasks involving repetitive physical activities, manual handling and poor posture
- The appropriate application of the following assessment tools:
 - HSE Manual Handling Assessment Tool (MAC)
 - HSE Assessment tool for repetitive tasks of the upper limbs (ART)
 - HSE Variable Manual Handling Assessment chart (V-MAC)
 - appendices 3 and 4 to the HSE's manual handling guidance (L23)
 - appendix 5 (VDU checklist) from HSE guidance (L26)
 - NIOSH Manual Material Handling (MMH) Checklist
 - Rapid Upper Limb Assessment (RULA)
- 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

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- work routine
- eye and eyesight testing
- training and information
- efficient movement principles
- personal considerations.

Recommended tuition time not less than 5 hours

Element IB10: Work environment risks and controls

Learning outcomes

- IB10.1 Explain the need for, and factors involved in, the provision and maintenance of temperature in both moderate and extreme thermal environments
- IB10.2 Explain the need for adequate and appropriate lighting in the workplace, units of measurement of light and the assessment of lighting levels in the workplace
- IB10.3 Explain the need for welfare facilities and arrangements in fixed and temporary workplaces
- IB10.4 Explain the provision for first aid in the workplace.

Content

IB10.1 The need for, and factors involved in, the provision and maintenance of temperature in both moderate and extreme thermal environments

- The importance of maintaining heat balance in the body
- 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)
- The meaning of thermal comfort and the need to provide a reasonable working temperature, as far as possible
- Equipment for measuring environmental parameters: thermometers; dry bulb, wet bulb, globe, anemometers, psychrometers, integrated electronic instruments including heat stress monitors
- Other parameters affecting thermal comfort: metabolic rate, clothing, sweat rate, duration of exposure
- The purpose of the heat stress index WBGT
- The practical control measures to minimise the risks when working in extreme thermal environments:
 - control heat source
 - control other environmental parameters
 - separation
 - workplace design
 - job design including job rotation
 - providing hot/cold drinks
 - clothing/PPE
 - health surveillance
 - training.

IB10.2 Adequate and appropriate lighting in the workplace, the units of measurement of light and the assessment of lighting levels in the workplace

- The necessity for lighting in workplaces
- Adequate and appropriate lighting levels for the work being undertaken; natural and artificial lighting, emergency/backup situations
- The impact of lighting levels on safety issues – incorrect perception, failure to see clearly, stroboscopic effects, colour assessment, effect on attitudes
- The effects of brightness contrast – disabling and discomfort glare, eye tissue damage from light exposure, visual fatigue
- Instrumentation, units (Lux) and measurement of light, the assessment of lighting levels and standards; the distinction between minimum lighting levels required for safety and higher levels often implemented taking account of ie, amenity, productivity, cost-effectiveness.

IB10.3 Welfare facilities and arrangements in fixed and temporary workplaces

- The provision of toilet, washing and changing facilities
- The storage of clothing
- Facilities for eating, rest rooms
- Facilities for pregnant women and nursing mothers, together with the practical arrangements
- The provision of facilities for smokers
- The need to take account of people with disabilities.

IB10.4 The provision for first aid in the workplace

- The basis of provision (numbers of employees, workplace risks and their assessment, proximity of emergency services etc)
- Typical arrangements eg, people, equipment and training.

Recommended tuition time not less than 5 hours

Unit IB: Tutor References

International statutory instruments (Directives, Conventions, Recommendations, Regulations and Protocols)

Reference title	Reference detail eg link to Convention	Element/s
Asbestos Convention, 1986 (C162) and Recommendation, 1986 (R172)	Link to C162 Link to R172	3
Chemical Convention, 1990 (C170) and Recommendation (R177)	Link to C170 Link to R177	2, 3
Directive 89/656/EEC - use of personal protective equipment	Link to Directive 89/656/EEC	3
Hygiene (Commerce and Offices), ILO Convention, 1964 (No 120) (C120) and Recommendation (R120)	Link to C120 Link to R120	10
Occupational Health Services Convention, 1985 (C161), ILO AND Recommendation, 2006 (No. 197)	Link to C161 Link to R197	1, 3, 4
Occupational Safety and Health Convention (C155) and Recommendation (R164)	Link to C155 Link to R164	1, 3
Protocol of 2002 to the Occupational Safety and Health Convention, 1981 (P155)	Link to P155	1, 3
Radiation Protection Convention, 1960 (No. 115) (C115) and Recommendation (R114)	Link to C115 Link to R114	7
Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), 18 December 2006 and subsequent amendments	Link to REACH	2
Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP)	Link to CLP Guidance	2, 3
Welfare Facilities Recommendation, R102, 1956	Link to R102	10
Working Environment (Air, Pollution, Noise and Vibration) Convention, 1977 (No 148) (C148) and Recommendation (R156)	Link to C148 Link to R156	6, 10

Other relevant international references

Reference title	Reference detail eg ISBN number	Element/s
A healthy return, Good practice guide to rehabilitating people at work	IOSH, Link to A healthy return	1
Ambient factors in the Workplace, International Labour Organisation (ILO) Code of Practice (CoP)	ISBN 92-2-11628-X Link to Ambient Factors	2, 3, 4, 5, 6, 7, 10
Documentation of the Threshold Limit Values for Physical Agents, ACGIH ¹	ISBN: 978-1-607260-45-5	4
Encyclopaedia of Occupational Health and Safety, ILO	Link to ILO Encyclopaedia	All elements

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Reference title	Reference detail eg ISBN number	Element/s
Ergonomic Checkpoints: Practical and easy-to-implement solutions for improving safety, health and working conditions, second edition, ILO Geneva 2010	ISBN 978-92-2-122666-6 Link to Ergonomic Checkpoints	9
Globally Harmonized System of Classification and Labelling of Chemicals (GHS)	Link to GHS	2
Health, Safety and Environment, A Series of Trade Union Educational Manuals for Agricultural Workers, ILO	ISBN: 92-2-115192-1 Link to Educational Manual	5
HIV/AIDS and the world of work, ILO Code of Practice	ISBN: 92-2-112561-0 Link to HIV/AIDS and the world of work	5
Management of alcohol and drug related issues in the workplace, ILO Code of Practice, 1999	ISBN: 92-2-109455-3 Link to Drug/Alcohol CoP	8
NIOSH ² Manual of Analytical Methods	Link to analytical methods	4
Occupational exposure to airborne substances harmful to health, ILO Code of Practice	ISBN: 92-2-102442-3 Link to Occupational exposure to airborne substances	3, 4
Permissible Exposure Limits (PELs)	OSHA ³ Link to PELs	4
Protection of workers against noise and vibration in the working environment, ILO Code of Practice	ISBN: 92-2-101709-5 Link to noise and vibration CoP	6
Radiation protection of workers, ionising radiations, ILO CoP, 1987	ISBN: 9-22-105996-0 Link to ILO Radiation CoP	7
Safety in the use of asbestos, ILO Code of Practice	ISBN: 92-2-103872-6 Link to Safety in the use of asbestos	3
Safety in the Use of Chemicals at Work, International Labour Office (ILO) Code of Practice (CoP), ILO, 1993. <ul style="list-style-type: none"> • Section 6: Operational control measures • Section 7: Design and installation 	ISBN: 92-2-108006-4 Link to Use of Chemicals CoP	2, 3, 4
Technical and ethical guidelines for workers' health surveillance, ILO guidance	ISBN: 92-2-110828-7 Link to health surveillance guidance	1, 4, 6
Workplace violence in services sectors and measures to combat this phenomenon	ILO, Link to violence in services sectors	8

¹ ACGIH – American Conference of Governmental Industrial Hygienists Inc

² NIOSH – National Institute for Occupational Safety and Health (USA)

³ OSHA – Occupational Safety & Health Administration (United States Department of Labour)

Other relevant UK references

Reference title	Reference detail eg ISBN number	Element/s
Asbestos: The survey guide, HSG264	HSE Books, ISBN: 978-0-7176-6502-0 Link to HSG264	3
Assessment of Repetitive Tasks (ART) Tool	Link to ART tool	9

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Reference title	Reference detail eg ISBN number	Element/s
Controlling airborne contaminants at work; A guide to local exhaust ventilation (LEV), HSG258	HSE Books, ISBN: 978-0-7176-6415-3 Link to HSG258	3
Control of lead at work, Approved Code of Practice and guidance, L132	HSE Books, ISBN: 978-0-7176-2565-6 Link to L132	3
Control of Substances Hazardous to Health, Approved Code of Practice and guidance, L5	HSE Books, ISBN: 978-0-7176-6582-2 Link to L5	5
Drug misuse at work a guide for employers, INDG91	HSE Books Link to INDG91	8
EH40/2005 Workplace exposure limits (as amended)	HSE Books, ISBN: 978-0-7176-6446-7 Link to EH40	4
Ergonomic Guidelines for Manual Material Handling	NIOSH Link to Manual Material Handling	9
Guidance for Employers on the Control of Artificial Optical Radiation at Work Regulations (AOR) 2010	HSE Books, Link to AOR Guidance	7
Hand-arm vibration exposure calculator	HSE, Link to HAV calculator	6
HSE's Health Surveillance Cycle	Link to health surveillance cycle	4
HSE Stress Management Standards	Link to stress management standards	8
Laser radiation: safety advice	Public Health England Link to Laser radiation safety advice	7
Lighting at Work, HSG38, second edition 1997	HSE Books, ISBN: 978-0-7176-1232-1 Link to HSG38	10
Managing asbestos in buildings: a brief guide, INDG223(rev5)	HSE Books, Link to INDG223	3
Managing the causes of work-related stress; A step by step approach to using the management standards, HSG218	HSE Books, ISBN: 978-0-7176-6273-9 Link to HSG218	8
Managing skin exposure risks at work, HSG262	HSE Books, ISBN: 978-0-7176-6649-2 Link to HSG262	2
Manual handling assessment charts (MAC Tool)	Link to MAC tool	9
Manual Handling, Manual Handling Operations Regulations 1992 (as amended), Guidance on Regulations, L23	HSE Books, ISBN: 978-0-7176-2823-0 Link to L23	9
Methods for the Determination of Hazardous Substances (MDHS) guidance	Link to MDHS	4
Monitoring strategies for toxic substances, HSG173	HSE Books, ISBN: 978-0-7176-6188-6 Link to HSG173	4
Noise calculators	HSE, Link to noise calculators	6
Personal protective equipment (PPE) at work; A brief guide, INDG174	HSE Books, Link to INDG174	3
Radon in the workplace	Link to HSE website: Radon	7
Rapid Upper Limb Assessment Tool (RULA)	Link to RULA	6
Respiratory protective equipment at work; A practical guide, HSG53	HSE Books, ISBN: 978-0-7176-6454-2 Link to HSG53	3
Safe, Effective, Quality Occupational Health Service (SEQOHS)	Link to SEQOHS	1
Safety of laser products; equipment classification and requirements	BS 60825-1:2014, ISBN: 978-0-580-77969-5	7

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Reference title	Reference detail eg ISBN number	Element/s
Seating at Work, HSG57, third edition 2002,	HSE Books, ISBN: 978-0-7176-1231-4 Link to HSG57	9
Understanding ergonomics at work, INDG90(rev2),	HSE Books Link to INDG90	9
Upper Limb Disorders in the Workplace – A Guide, second edition 2002, HSG60	HSE Books, ISBN: 978-0-7176-1978-8 Link to HSG60	9
Variable manual handling assessment chart (V-MAC) tool	Link to V-MAC tool	9
Violence at work: A guide for employers, INDG69	HSE Books, Link to INDG69	8
Whole body vibration calculator	HSE, Link to WBV calculator	6
Work Related Upper Limb Disorders – A Guide, HSG60	HSE Books, ISBN: 978-0-7176-1978-8 Link to HSG60	9
Working with display screen equipment, L26	HSE Books, ISBN: 978-0-7176-2582-6 Link to L26	9
Working with substances hazardous to health, INDG136	HSE Books, Link to INDG136	2, 3, 4
Workplace health: long-term sickness absence and incapacity to work, NICE guidelines (PH19)	Link to PH19	1

Unit IC: Workplace and work equipment safety

Aim of the unit

This unit provides students with a thorough grounding in all major aspects of health and safety. It aims to prepare students for a career in health and safety by providing them with the ability to apply their knowledge and understanding of workplace and work equipment safety issues in the workplace. In addition this knowledge and understanding prepares students for the written question paper assessment in Unit IC and the practical application (Unit DNI) which will be carried out in their own workplace.

Element IC1: Workplace welfare requirements and specific workplace issues

Learning outcomes

- IC1.1 Explain the need for, and factors involved in, the provision and maintenance of a safe working environment
- IC1.2 Explain the hazards, risks and control measures associated with work in confined spaces
- IC1.3 Outline the main issues associated with maintaining structural safety of workplaces
- IC1.4 Explain the hazards, risks, and controls when working at height
- IC1.5 Explain the hazards, risks and controls for lone working.

Content

IC1.1 Safe working environment

- Practical considerations in providing and maintaining safe places of work and safe means of access and egress; using safety signs ie, type of safety signs and the typical areas where they would be used
- The design of surfaces to reduce slipping
- Coefficient of Friction (CoF), slip resistant testing of footwear and surfaces:
 - effects of wetting and contamination
 - 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.

IC1.2 Confined spaces

- The meaning of confined spaces
- Examples of where confined space entry may occur in the workplace: eg, pits in garages, trunking ducts, watercourses, trenches, tanks, silos, sewers
- The factors to be considered when assessing risk: access arrangements; likely atmospheres to be encountered (including oxygen enriched, oxygen depleted, toxic and

flammable); the task, materials and equipment; persons at risk; reliability of safeguards (including personal protective equipment)

- The factors to be considered in designing safe working practices: operating procedures and emergency policy/procedures; and training for work in confined spaces.

IC1.3 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 failures such as poor design, substandard construction, cutting roof beams; puncturing holes through floors; removal of internal walls etc can lead to collapse.

IC1.4 Working at height

- The main hazards and risks, the alternatives to working at height, precautions and safe working procedures for working at height in general workplaces (including rescue measures)
- Hierarchy of control measures:
 - avoid working at height
 - use an existing safe place of work
 - provide work equipment to prevent falls (including MEWPS)
 - mitigate the distance and consequences of a fall
 - instruction and training and/or other means.

IC1.5 Lone working

- The main hazards and risks
- 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
- Alternatives, precautions and safe working procedures for lone working
- Lone worker emergency devices and personal communications.

Recommended tuition time not less than 7 hours

Element IC2: Fire and explosion

Learning outcomes

- IC2.1 Outline the properties of flammable and explosive materials and the mechanisms by which they ignite
- IC2.2 Outline the behaviour of structural materials, buildings and building contents in a fire
- IC2.3 Outline the main principles and practices of prevention and protection against fire and explosion.

Content

IC2.1 Properties of flammable and explosive materials and the mechanisms by which they ignite

- The properties of solids, liquids and gases with respect to influence on combustion
- The meaning of: flash point, fire point, auto-ignition temperature, vapour density, limits of flammability, 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 and mechanisms of fire-spread including:
 - how an explosion/fire occurs
 - the stages of combustion: induction, ignition, growth, steady state and decay
 - mechanisms of unconfined vapour cloud explosions, confined vapour cloud explosions and boiling liquid expanding vapour 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
- The process of oxidation and the effects of oxidising substances on fire and explosion mechanisms
- 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)
- The causes and effects of:
 - unconfined vapour cloud explosion
 - boiling liquid expanding vapour explosion (BLEVE)
 - confined vapour cloud explosion
- The prevention and mitigation 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 Exposure Limit (LEL) and Upper Exposure Limit (UEL)

- Dust explosions:
 - examples of industries/plant with potential dust explosion hazards (ie, food industry, LEV)
 - the mechanisms of dust explosions including the importance of combustible solid particle size, dispersal, explosive concentrations, ignition, energy, temperature and humidity
 - the dust pentagon
 - primary and secondary explosions
 - the prevention and mitigation of dust explosions.

IC2.2 The 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 (ie, steel, concrete, wood); level of fire resistance
- The behaviour of common building contents in fire (ie, paper-based, fabrics, plastics)

IC2.3 Fire and explosion prevention and protection

- Structural protection (eg, openings and voids, compartmentation, fire-stopping)
- The key features of plant design and process control
- The 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.

Recommended tuition time not less than 5 hours

Element IC3: Workplace fire risk assessment

Learning outcomes

- IC3.1 Explain the processes involved in the identification of hazards and the assessment of risk from fire
- IC3.2 Describe common fire detection and alarm systems and procedures
- IC3.3 Describe the factors to be considered when selecting fixed and portable fire-fighting equipment for the various types of fire
- IC3.4 Outline the factors to be considered in providing and maintaining the means of escape
- IC3.5 Explain the purpose of, and essential requirements for, emergency evacuation procedures.

Content

IC3.1 The identification of hazards and the assessment of risk from fire

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

IC3.2 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
 - the principal components of alarm systems; detection and signalling
 - manual and automatic systems.

IC3.3 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.

IC3.4 Means of escape

- The factors to be considered in the provision and maintenance of a means of escape
- The general requirements for travel distances, stairs, passageways and doors, emergency lighting, exit and directional signs
- Maintaining fire safety in communal areas.

IC3.5 Emergency evacuation procedures

- The purposes of and essential requirements for, evacuation procedures and drills, alarm evacuation and roll call
- The provision of Fire Marshalls and their role
- Personal Emergency Evacuation Plans (PEEPs).

Recommended tuition time not less than 6 hours

Element IC4: The storage, handling and processing of dangerous substances

Learning outcomes

- IC4.1 Outline the main physical and chemical characteristics of industrial chemical processes
- IC4.2 Outline the main principles of the safe storage, handling and transport of dangerous substances
- IC4.3 Outline the main principles of the design and use of electrical systems and equipment in adverse or hazardous environments
- IC4.4 Explain the need for emergency planning and the typical organisational arrangements needed for emergencies.

Content

IC4.1 Industrial chemical processes

- The effects of temperature, pressure and catalysts on rates of chemical reactions
- Heat of reaction in terms of exothermic and runaway reactions
- Examples of exothermic reaction (ie, combustion); example of runaway reaction (ie, Bhopal, 1984)
- Methods of controlling exothermic and runaway reactions.

IC4.2 The storage, handling and transport of dangerous substances

- The storage methods and quantities – bulk storage, intermediate storage, drum storage, specific locations
- The storage of incompatible materials and their segregation requirements and access
- Leakage and spillage containment – bunding, problems encountered during filling and transfer
- The storage and handling of dangerous substances:
 - flow through pipelines
 - the principles of filling and emptying containers
 - the principles of dispensing, spraying and disposal of flammable liquids
 - the dangers of electricity in hazardous areas
- The transport of dangerous substances:
 - key safety principles in loading and unloading of tankers and tank containers
 - labelling of vehicles and packaging of substances
 - the importance of driver training programmes.

IC4.3 Hazardous environments

- The principles of: resistance to mechanical damage, protection against solid bodies, objects and dusts, protection against liquids and gases

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- Wet environments – including corrosion and degradation of installation and damage to electrical systems
- The principles of selection of electrical equipment for use in flammable atmospheres
- The classification of hazardous areas, zoning
- The use of permits-to-work
- The principles of pressurisation and purging
- Intrinsically safe equipment, flameproof equipment, type 'N' equipment, type 'e' equipment.

IC4.4 Emergency planning

- The need for emergency preparedness within an organisation with reference to ILO Convention C174 Prevention of Major Industrial Accidents (1993) and the ILO Code on the Prevention of Major Industrial Accidents (1991)
- 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 competent 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 local legislation and/or other standards
- The need for ongoing monitoring and maintenance of emergency plans.

Recommended tuition time not less than 7 hours

Element IC5: Work equipment

Learning outcomes

- IC5.1 Outline the criteria for the selection of suitable work equipment for particular tasks and processes to eliminate or reduce risks
- IC5.2 Explain how risks to health and safety arising from the use of work equipment are controlled
- IC5.3 Explain safe working procedures for the maintenance, inspection and testing of work equipment according to the risks posed
- IC5.4 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
- IC5.5 Outline the maintenance, failure modes and prevention strategies when working with pressure systems.

Content

IC5.1 The selection of suitable equipment

- The suitability of work equipment for the required task, process and environment
- The suitability of the design, construction and adaptation of work equipment
- 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.

IC5.2 Risks to health and safety arising from the use of work equipment

- The need for conducting risk assessments in the use of work equipment
- The risks associated with using work equipment which arise from its initial integrity, the location where it will be used, and the purpose for which it will be used
- The risks associated with using work equipment which arise from its: incorrect installation or re-installation; deterioration; or, 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 providing guards); taking appropriate 'software' measures (such as following safe systems of work and providing information, instruction and training).

IC5.3 Maintenance, inspection and testing

- The hazards and control measures associated with the maintenance of work equipment
- The three maintenance management strategies of: planned preventive; condition based; and breakdown

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- The factors to be considered in developing a planned maintenance programme for safety-critical components
- The need for the maintenance of work equipment, including hired work equipment
- The factors to be considered in determining inspection regimes having consideration of 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
- The typical causes of failures – excessive stress, abnormal external loading, metal fatigue, ductile failure, brittle fracture, buckling and corrosive failure
- The advantages and disadvantages of non-destructive testing.

IC5.4 Competence, training, information and supervision in relation to work equipment

- 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 and supervision (external and self-supervision)
- The circumstances where there are specific training needs for certain hazardous types of work equipment (including self-propelled work equipment, chainsaws, woodworking machines, power presses, abrasive wheels)
- The scope of information required for the safe use and operation of work equipment, specifically: the conditions under which the work equipment may be used; foreseeable abnormal situations and the action to be taken; and any conclusions to be drawn from experience in usage
- The methods by which information and instructions regarding the operation and use of work equipment can be easily understood by those concerned.

IC5.5 Pressure systems

- Definition of a pressure system
- Types of inspection, frequencies and the statutory basis for examination of pressure systems
- Prevention and testing strategy: design and construction, repair and modification, information and marking, safe operating limits, written scheme of examination, maintenance and record keeping, competent persons.

Recommended tuition time not less than 9 hours

Element IC6: Workplace machinery

Learning outcomes

- IC6.1 Outline the principles of safety integration and the considerations required in a general workplace machinery risk assessment
- IC6.2 Outline the principal generic mechanical and non-mechanical hazards of general workplace machinery
- IC6.3 Outline the main types of protective devices found on general workplace machinery
- IC6.4 Explain the principles of control associated with the maintenance of general workplace machinery
- IC6.5 Explain the key safety characteristics of general workplace machinery control systems.

Content

IC6.1 Safety integration and machinery risk assessment

- Definition of machinery
- The role and application of standards relating to machinery
- C119 Guarding of Machinery Convention and International Standards EN ISO 12100 and ISO/TR 14121
- The principles of safety integration:
 - 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 to 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
- The purpose of CE marking and the relevance and limitation 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.

IC6.2 Generic hazards

- Common machinery hazards in a range of general workplaces: drills (radial arm, pedestal), circular saws, guillotines, 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.

IC6.3 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.

IC6.4 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.

IC6.5 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; do 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; do not impede the operation of any stop/energy stop controls
 - the 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
 - the position and marking of controls to be visible and identifiable
 - the consideration of ergonomic principles.

Recommended tuition time not less than 9 hours

Element IC7: Mobile, lifting, access and work at height equipment

Learning outcomes

- IC7.1 Outline the main hazards and control measures associated with mobile work equipment
- IC7.2 Outline the main hazards and control measures associated with lifting equipment
- IC7.3 Outline the main hazards and control measures associated with access equipment and equipment for working at height.

Content

IC7.1 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, excessive speed, failure to stop, contact with wheels and tracks, falls of objects, moving parts/drive shafts/power take-offs, over-heating)
- The hazards associated with the refuelling or charging (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), to include: lift trucks (counterbalance, reach, rough terrain, telescopic materials handlers, side loading trucks, pedestrian controlled trucks), agricultural tractors and works vehicles, including safe layout of areas where mobile equipment is used and the protection of pedestrians and using lifting plans
- Using 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 training lift truck operators (basic, specific job training and familiarisation).

IC7.2 Lifting equipment: hazards and control measures

- The applications and 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 using: hoists (gin wheel, construction site platform hoist) and lifts (passenger and goods, scissor, vehicle inspection, MEWPs)
- The control measures when using: cranes (selection, siting, and stability of cranes); hoists and lifts; integrity of lifting equipment; competence of workers; maintenance, inspection; and statutory examinations.

IC7.3 Access and work at height equipment: hazards and control measures

- The applications and 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 from the carrier); exceeding safe working load/persons permitted
- The 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; preventing 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.

Recommended tuition time not less than 6 hours

Element IC8: Electrical safety

Learning outcomes

- IC8.1 Outline the basic concepts of electricity
- IC8.2 Outline the hazards of electricity and static electricity
- IC8.3 Outline the issues relevant to the installation, use, inspection and maintenance of electrical systems
- IC8.4 Outline the main principles for safe working in the vicinity of high voltage systems
- IC8.5 Outline the main hazards, risks and controls associated with the use of portable electrical equipment.

Content

IC8.1 Basic concepts of electricity

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

IC8.2 Hazards of electricity and static electricity

- The effects of electric shock on the body: pain, burns, muscular contraction, respiratory failure, heart fibrillation, cardiac arrest
- The 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.

IC8.3 The installation, use and inspection of electrical systems

- The 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

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- Control measures:
 - the 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
- The 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
- The use of permits-to-work
- The meaning of 'competent person'.

IC8.4 Safe working in the vicinity of high voltage systems

- Common high voltage systems and the 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.

IC8.5 Portable electrical equipment

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

Recommended tuition time not less than 7 hours

Element IC9: Construction and works of a temporary nature - hazards and controls

Learning outcomes

- IC9.1 Outline the scope and nature of construction activities
- IC9.2 Outline the principal duties and specific responsibilities for the effective management of health and safety on construction sites
- IC9.3 Explain the appropriate site control measures that should be adopted to protect employees and others during construction work
- IC9.4 Outline the hazards and control measures associated with working at height from fixed work or temporary platforms
- IC9.5 Explain the hazards and control measures, associated with demolition work
- IC9.6 Explain the hazards and control measures associated with excavation work.

Content

IC9.1 The 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
- The 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; fire arrangements; time pressures from clients; weather conditions; levels of numeracy and literacy of workers; local or foreign language workers.

IC9.2 The management of health and safety on construction sites

- The respective roles and responsibilities of clients, designers/engineers/architects, co-ordinator, principal contractors and contractors
- Planning, co-ordination and notification
- The relevance of site layout; access and egress; protection of the public
- The use of method statements and permits-to-work.

IC9.3 Protecting employees and others during construction work

- Site security (perimeter fencing, signs, safe viewing points, means of securing plant/chemicals, means of controlling dangers such as mud on public highways)
- Arrangements (including site rules, cooperation, shared facilities, first aid and welfare facilities)
- Arrangements for site inductions.

IC9.4 Working at height from fixed or temporary platforms

- The hazards associated with working at height
- The safe use of temporary (immobile) access equipment including ladders, trestles, scaffolds – simple independent and tower scaffolds
- The erection, use and dismantling of scaffolds and falsework
- 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 of personal and collective fall arrest devices (safety nets, airbags, belts and harnesses).

IC9.5 Demolition work

- The main techniques used in demolition of buildings and the associated hazards and control measures 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.

IC9.6 Excavations

- The 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
 - the need for temporary shoring (drag boxes, piling)
 - the methods for checking for buried services and the precautions to be observed
 - the use of 360° excavators
- The requirements for inspections and examinations of excavations.

Recommended tuition time not less than 8 hours

Element IC10: Workplace transport and managing work-related road risk

Learning outcomes

IC10.1 Outline the factors to be considered in a workplace transport risk assessment and the controls available for managing workplace transport risk

IC10.2 Outline the role and purpose of a work-related road risk policy and the key components of a work-related road traffic safety management system.

Content

IC10.1 Workplace transport risk assessment and risk controls

- The factors to be considered in a workplace transport risk assessment (including those factors associated with shared workplaces)
- The reasons for providing information to all employees and visitors to site relating to workplace transport issues
- Controlling risks from workplace transport with reference to HSG136 (A guide to workplace transport safety):
 - safe site
 - traffic route design
 - activity
 - safe vehicle
 - safe driver.

IC10.2 Work-related road risk policy and components of a work -related road traffic safety management system (RTSMS)

- Work-related road risk policy:
 - role and purpose of the policy
 - established and signed by 'top management'
 - typical content, including the policy being appropriate to the organisation
 - communicating the policy to all relevant employees
 - recording and review
- The reasons for the introduction of a road traffic safety management system and the possible key elements/components (with reference to ISO 39001:2012 – Road traffic safety (RTS) management systems):
 - planning
 - actions to address risks and opportunities
 - identification of performance factors: risk exposure factors (distance travelled, road traffic volume (motorways v 'B' roads)
 - intermediate safety outcome factors: the use of appropriate roads (vehicle type and cargo); the use of personal safety equipment (seat belts, motorcycle helmets etc); safe speed limits; weather conditions; fitness of drivers; journey planning; the use of road-worthy vehicles; employees authorised to drive; removal of unfit drivers and vehicles; post-crash response (including recovery and rehabilitation)
 - setting objectives

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- support
 - allocation of resources
 - the use of competent drivers (based on appropriate education, training and experience)
 - make employees aware of the policy, their contribution to the effectiveness of the policy/RTSMS, implications of individual non-compliance
 - document information
 - ensure relevant policies/procedures/information is documented
 - control of documented information
 - operation
 - operational planning and control
 - emergency preparedness and response
 - performance evaluation
 - monitoring, measurement, analysis and evaluation of the RTSMS
 - accident investigation
 - internal audit
 - management review
 - improvement
 - non-conformity and corrective action
 - continual improvement
- Benefits and limitations of a RTSMS.

Recommended tuition time not less than 6 hours

Unit IC: Tutor References

Health and safety incidents

(reference to Element IC2.1)

Buncefield (unconfined vapour cloud explosion) [Link to Buncefield Report](#)

Flixborough (unconfined vapour cloud explosion) [Link to Flixborough accident summary](#)

Mexico City (boiling liquid expanding vapour explosion – BLEVE) [Link to Mexico City accident summary](#)

Hickson and Welch (confined vapour cloud explosion) [Link to Hickson & Welch accident summary](#)
(reference to Element IC4.1)

Union Carbide, Bhopal <http://www.bhopal.com/>

(reference to Element IC4.2)

Buncefield [Link to Buncefield Report](#)

Texas City Refinery, 2005 [US Chemical Safety Board - Texas City, 2005](#)

International statutory instruments (Directives, Conventions, Recommendations and Protocols)

Reference title	Reference detail eg link to Convention	Element/s
Chemical Convention, 1990 (C170) and Recommendation (R177)	Link to C170 Link to R177	4
Directive 2006/42/EC - machinery directive	Link to Directive 2006/42/EC	6
Directive 2006/95/EC - electrical equipment	Link to Directive 2006/95/EC	8
Directive 2009/104/EC - use of work equipment	Link to Directive 2009/104/EC	5, 6
Guarding of machinery convention, 1963 (C119) and Recommendation (R118)	Link to C119 Link to R118	5, 6, 7
Hours of Work and Rest Periods (Road Transport) Convention 1979 (No. 153) - C153 and Recommendation R161	Link to C153 Link to R161	10
Hygiene (Commerce and Offices), ILO Convention, 1964 (No 120) (C120) and Recommendation (R120)	Link to C120 Link to R120	1
Prevention of Major Industrial Accidents Convention, ILO, C174 and Recommendation R181	Link to C174 Link to R181	3, 4, 5
Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP)	Link to CLP Guidance	4
Safety and Health in Construction Convention, C167, 1988, ILO and Recommendation R175	Link to C167 Link to R175	9
Welfare Facilities Recommendation, R102, 1956	Link to R102	1

Other relevant international references

Reference title	Reference detail eg ISBN number	Element/s
Ambient factors in the Workplace, International Labour Organisation (ILO) Code of Practice (CoP)	ISBN 92-2-11628-X Link to Ambient Factors	8
ATEX Guidelines: 3rd Edition, June 2009 (updated May 2011)	Link to ATEX Guidelines	2, 3
Emergency plan, CFPA-European Guideline, CFPA-E No 25:2010 F	Link to CFPA-Europe	3
Encyclopaedia of Occupational Health and Safety, ILO	Link to ILO Encyclopaedia	All elements
Graphical symbols – Registered safety signs, ISO 7010:2011,	International Organisation for Standardisation (ISO)	1
ICC International Fire Code	ISBN: 978-1-6098-3473-9	3
Introduction to qualitative fire risk assessment, CFPA-European Guideline, CFPA-E No 4:2010 F	Link to CFPA-Europe	3
Prevention of major industrial accidents, ILO, Code of Practice	ISBN: 92-2-107101-4 Link to Prevention of major industrial accidents CoP	4, 5
Safety and Health in Construction, ILO Code of Practice	ISBN: 92-2-107104-9 Link to Construction CoP	9
Safety and health in the use of machinery, ILO Code of Practice	ISBN: 978-92-2-127726-2 Link to Machinery CoP	5, 6, 7
Safety in the use of chemicals at work, ILO Code of Practice	ISBN: 92-2-108006-4 Link to safety in the use of chemicals	3, 4
Safety of machinery – General principles for design – Risk assessment and risk reduction	ISO 12100:2010, ISBN: 978-0-580-74262-0	6
Safety of machinery, basic concepts, general principles for design, basic terminology, methodology	ISO 12100-1:2003+A1:2009, ISBN: 978-0-580-68672-6	6
Safety of machinery, basic concepts, general principles for design, technical principles	ISO 12100-2:2003+A1:2009, ISBN 978-0-580-68673-3	6
Transport of Dangerous Goods, revision 19	UNEC ¹ , ISBN: 978-92-1-139154-1	4

¹ UNEC: United Nations Economic Commission for Europe

Other relevant UK references

Reference title	Reference detail eg ISBN number	Element/s
A guide to workplace transport safety, HSG136	HSE Books, Link to HSG136	10
Avoiding danger from overhead power lines, GS6	HSE Books, Link to GS6	8, 9
Avoiding danger from underground services, HSG47	HSE Books, ISBN: 978-0-7176-6584-6 Link to HSG47	8, 9
Buying new machinery, INDG271	HSE Books Link to INDG271	6
Controlling fire and explosion risks in the workplace, INDG370	HSE Books, Link to INDG370	3, 4

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Reference title	Reference detail eg ISBN number	Element/s
Driving at Work – Managing Work-Related Road Safety, INDG382	HSE Books Link to INDG382	10
Electricity at Work – Safe Working Practices, HSG85	HSE Books, ISBN: 978-0-7176-2164-4 Link to HSG85	8
Fire Safety Risk Assessment series, Communities and Local Government Publications 1. Offices and shops 2. Factories and warehouses 3. Sleeping accommodation 4. Residential care premises 5. Educational premises 6. Small and medium places of assembly 7. Large places of assembly 8. Theatres, cinemas and similar premises 9. Open air events and venues, 10. Healthcare premises, 11. Transport premises and facilities	1. ISBN: 978-1-8511-2815-0 2. ISBN: 978-1-8511-2816-7 3. ISBN: 978-1-8511-2817-4 4. ISBN: 978-1-8511-2818-1 5. ISBN: 978-1-8511-2819-8 6. ISBN: 978-1-8511-2820-4 7. ISBN: 978-1-8511-2821-1 8. ISBN: 978-1-8511-2822-8 9. ISBN: 978-1-8511-2823-5 10. ISBN: 978-1-8511-2824-2 11. ISBN: 978-1-8511-2825-9 Link to Fire Risk Assessment series	3
Globally Harmonized System of Classification and Labelling of Chemicals (GHS)	Link to GHS	4
Health and safety in construction, HSG150	HSE Books, ISBN: 978-0-7176-6182-2 Link to HSG150	9
IET Wiring Regulations 17th Edition (first amendment)	BS7671: 2008+A1:2011, ISBN: 978-1-84919-269-9	8
ISO 39001:2012 Road traffic safety (RTS) management systems – requirements with guidance for use	ISBN: 978-0-5806-6851-7	10
Lifting equipment at work, A brief guide, INDG290	HSE Books, Link to INDG290	5, 7
Maintaining Portable and Transportable Electrical Equipment, HSG107	HSE Books, ISBN: 978-0-7176-2805-6 Link to HSG107	5, 8
Pressure systems, A brief guide to safety, INDG261	HSE Books, Link to INDG261	5
Providing and using work equipment safely, A brief guide, INDG291	HSE Books, Link to INDG291	5
Risk assessment, A brief guide to controlling risks in the workplace, INDG163	HSE Books, Link to INDG163	3
Safe work in confined spaces, Approved Code of Practice and guidance, L101	HSE Books, ISBN: 978-0-7176-6622-5 Link to L101	1
Safety in Working with Lift Trucks, HSG6	HSE Books, ISBN: 978-0-7176-1781-4 Link to HSG6	7
Storage of dangerous substances, Dangerous Substances and Explosives Atmospheres Regulations 2002, Approved Code of Practice and guidance, L135	HSE Books, 978-0-7176-2200-9 Link to L135	4
Supplying new machinery, INDG270	HSE Books, Link to INDG270	6
The safe isolation of plant and equipment, HSG253	HSE Books, ISBN: 978-0-7176-6171-8 Link to HSG253	8
Work at height, A brief guide, INDG401	HSE Books, Link to INDG401	1, 7, 9
Working alone, Health and safety guidance on the risks of lone working, INDG73	HSE Books, Link to INDG73	1

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Reference title	Reference detail eg ISBN number	Element/s
Workplace Transport Safety – Guidance for Employers, HSG136	HSE Books, ISBN: 978-0-7176-6154-1 Link to HSG136	10

5.4 Unit DNI: Application of health and safety in the workplace

Aim of the unit

Unit DNI will enable students to demonstrate their ability by applying the knowledge and understanding gained from their Units IA, IB and IC studies to a practical workplace situation.

Purpose and aim

The purpose of this Unit is for students to complete an assignment which will assess the practical application of the knowledge and understanding gained from their studies of Units IA, IB and IC of the syllabus in a vocational setting.

The aim of the assignment is for students to carry out a review of the arrangements for managing health and safety in a workplace and to produce justified, proportionate recommendations to improve health and safety performance.

Students will be required to demonstrate their understanding of the role of a health and safety practitioner and the adoption of a proportionate response to risk.

Content

Unit DNI contains no additional syllabus content. However, completion of study for Units IA, IB and IC is recommended in order to undertake the Unit DNI assignment. Accredited course providers and students are reminded that Element IA9 of Unit IA will only be assessed in Unit DNI.

Assignment brief

The student is required to carry out a review of the arrangements for managing health and safety in a workplace and to produce justified, proportionate recommendations to improve performance.

The assignment will require the student to apply the knowledge and understanding gained from their studies of elements of Units IA, IB and IC in a practical environment and to carry out critical analysis and evaluation of information gathered during the review.

The assignment should include the following.

- An introduction that sets the scene by stating clear aims and objectives and a description of the methodology used to carry out the assignment. The introduction should also include a description of the chosen workplace and the role of the health and safety practitioner to set a context for the assignment.
- A critical analysis of how health and safety is currently managed by the organisation in which the student reviews leadership, management, worker involvement, competence, legal compliance and risk profile.
- An evaluation based on the review, of where improvements should be made.
- Conclusions which summarise the main issues identified.
- Justified, proportionate, recommendations based on the outcome of the review.
- An executive summary.
- References / Bibliography

- Appendices.

Assessment location

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

Students do not require supervision when carrying out the assignment, but the student must sign a declaration that Unit DNI is their own work.

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

Submission of completed work

Assignment reports should be submitted before the set submission date; there are four submission dates each year in February, May, August and November.

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

Assignments must be submitted electronically directly to NEBOSH. Students 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 students register but fail to submit.

Marking

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

Further information

Further detailed information regarding Unit DNI including forms and mark schemes will be produced in a separate guidance document for students and accredited course providers available from the NEBOSH website (www.nebosh.org.uk): 'Unit DNI Assignment guidance and information for students'.

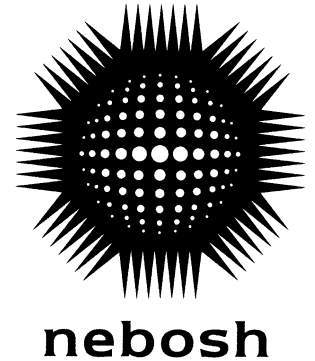
5. Sample question papers

5.1 Unit IA: Managing health and safety

THE NATIONAL EXAMINATION BOARD IN
OCCUPATIONAL SAFETY AND HEALTH

NEBOSH INTERNATIONAL DIPLOMA IN
OCCUPATIONAL HEALTH AND SAFETY

Unit IA: 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) **Giving** reasons in **EACH** case, **identify FIVE** persons` who could be interviewed to provide information for an investigation into a workplace accident. (5)
- (b) **Outline** the issues to consider when *preparing* the accident investigation interviews for workers from within the organisation. (5)
- 2 In relation to health and safety, **outline** the status **AND** role of:
- (a) ratified international conventions; (5)
- (b) ratified international recommendations. (5)
- 3 **Outline**, with appropriate examples, the key features of the following risk management concepts:

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- (a) risk avoidance; (2)
 - (b) risk reduction; (2)
 - (c) risk transfer; (3)
 - (d) risk retention. (3)
- 4 (a) **Outline** the role of effective consultation arrangements with employees concerning health and safety matters in the workplace. (4)
- (b) **Outline** the range of formal and informal arrangements that may contribute to effective consultation on health and safety matters in the workplace. (6)
- 5 **Outline**, with examples, the benefits and limitations of:
- (a) prescriptive legislation; (5)
 - (b) goal setting legislation. (5)
- 6 A maintenance worker was asphyxiated when working in an empty fuel tank. A subsequent investigation found that the worker had been operating without a permit-to-work.
- (a) **Outline** why a permit-to-work would be considered necessary in these circumstances. (3)
 - (b) **Outline** possible reasons why the permit-to-work procedure was not followed on this occasion. (7)

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) **Outline** the principles, application and limitations of Event Tree Analysis as a risk assessment technique. (6)

- (b) A mainframe computer suite has a protective system to limit the effects of fire. The system comprises a smoke detector connected by a power supply to a mechanism for releasing extinguishing gas. It has been estimated that a fire will occur once every 5 years ($f=0.2/\text{year}$). Reliability data for the system components are as follows:

Component	Reliability
Detector	0.90
Power supply	0.99
Extinguishing gas release mechanism	0.95

- (i) **Construct** an event tree for the above scenario to **calculate** the frequency of an uncontrolled fire in the computer suite. (10)
- (ii) **Suggest** ways in which the reliability of the system could be improved. (4)

- 8 (a) **Explain** the objectives of:
- (i) active health and safety monitoring; (5)
 - (ii) reactive health and safety monitoring. (5)
- (b) **Outline FIVE** *active* health and safety monitoring methods. (5)
- (c) **Outline FIVE** *reactive* health and safety monitoring methods. (5)

- 9 A senior management team have requested a detailed report to justify resources needed for the management of health and safety.

Outline reasons for managing health and safety that you would include in the report. (20)

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(November 2015 specification)*

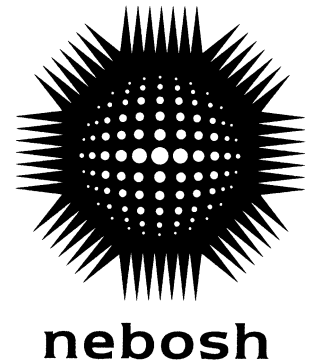
- 10 (a) **Outline** the meaning of 'skill based', 'rule based' **AND** 'knowledge based' behaviour. (6)
- (b) With reference to practical examples or actual incidents, **explain** how **EACH** of these types of operating behaviour can cause human error **AND**, in **EACH** case, **explain** how human error can be prevented. (14)
- 11 (a) **Give** the meaning of the term '*health and safety culture*'. (2)
- (b) **Outline** the role of an organisation in the development of a positive health and safety culture. (12)
- (c) **Identify** ways of measuring the effectiveness of a health and safety culture. (6)

5.2 Unit IB: Hazardous substances / agents

THE NATIONAL EXAMINATION BOARD IN
OCCUPATIONAL SAFETY AND HEALTH

NEBOSH INTERNATIONAL DIPLOMA IN
OCCUPATIONAL HEALTH AND SAFETY

Unit IB: Hazardous substances / agents



[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 Workers in a chemical plant are provided with gloves to protect against the possible effects of the chemicals. In recent months, there has been an increase in the number of hand and lower arm skin complaints amongst these workers.

Outline possible reasons for this increase in skin complaints. **(10)**

- 2 (a) **Identify** the way in which lasers are classified according to their hazard.

(2)

- (b) Low power lasers are widely used to read bar-code labelled products at checkouts in retail premises.

Outline:

- (ii) the design features; (4)
(ii) the procedural controls (4)

that should be in place for the safe operation and maintenance of the equipment.

- 3 Identify** a range of information sources that an employer could use in order to determine the extent of work-related stress for workers within an organisation. (10)

- 4** Workers on a food production line have to pick up rectangles of pasta from a delivery conveyor and place them into trays on a separate conveyor. This involves 8 hour shifts and is carried out standing in front of the conveyors.

Following complaints from a number of workers about pains in their arms and shoulders, you have been asked to carry out an ergonomic assessment for this operation.

- (a) **Outline** the ergonomic risk factors to be taken into account when making such an assessment **AND outline** how these may be contributing to the problems experienced by the workers in this situation. (5)

- (b) Total automation of the process is not possible. **Outline** other control measures that could be taken to reduce the ill-health effects being experienced by the workers. (5)

- 5** Workers cutting and finishing stone are exposed to silica dust.

Outline factors to be considered when carrying out a 'suitable and sufficient' assessment of the risks from exposure to silica dust. (10)

- 6** (a) **Outline** the health effects associated with the Human immunodeficiency virus (HIV). (3)

- (b) **Outline** control measures to protect against occupational exposure to the virus. (7)

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 small motor vehicle repair workshop uses paints known to contain isocyanates.
- (a) **Outline** the health effects from exposure to isocyanates. **(3)**
 - (b) **Outline** the factors to consider when assessing the risks arising from using these paints. **(7)**
 - (c) **Outline** the practical measures to control exposure to the isocyanates when spray painting the vehicles in the workshop. **(10)**
- 8** A newspaper printing organisation that employs 80 workers operates several printing presses in a large open-plan area. Noise is considered to be a problem.
- (a) **Identify** the information that should be obtained before carrying out a noise survey in the open-plan area. **(6)**
 - (b) **Explain** how the noise survey should be carried out **AND** the type of equipment that could be used to assess workers' exposure to noise. **(14)**
- 9**
- (a) **Explain** the meaning of the term 'toxicity'. **(2)**
 - (b) **Describe** the physical characteristics of asbestos and **give TWO** occupational examples where it is likely to be encountered. **(4)**
 - (c) **Outline** the diseases caused by exposure to asbestos **AND** their signs and symptoms. **(7)**
 - (d) **Outline** the equipment and method that should be used to determine the level of asbestos fibres in the air in the workplace. **(7)**

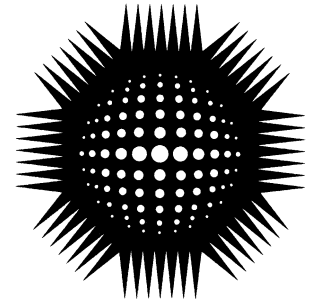
- 10** A distribution company employs 300 workers as drivers, warehouse operatives and office staff, processing telephone and internet orders.
- (a) **Identify** the possible functions of this company's occupational health department:
- (i) when recruiting new workers; **(4)**
 - (ii) when a worker returns to work after ill-health. **(5)**
- (b) **Outline** *other* ways in which the occupational health department can assist the management team to improve health and safety within this organisation.
(11)
- (You do not need to consider those functions you have already addressed in part a).**
- 11** (a) **Identify** the typical signs **AND** symptoms of Legionnaires' disease. **(5)**
- (b) **Outline** the conditions under which legionella bacteria may grow. **(3)**
- (c) **Outline** the means of controlling the growth of legionella bacteria. **(12)**

5.3 Unit IC: Workplace and work equipment safety

**THE NATIONAL EXAMINATION BOARD IN
OCCUPATIONAL SAFETY AND HEALTH**

**NEBOSH INTERNATIONAL DIPLOMA IN
OCCUPATIONAL HEALTH AND SAFETY**

Unit IC: Workplace and work equipment



nebosh

[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 sewage drain has collapsed and it is necessary to inspect the damage prior to its repair. The inspection requires entry into a confined space 10 metres deep.

Outline the possible risks to those entering the sewer.
(10)

- 2** **Outline** what should be considered when preparing a scheme for the systematic examination, testing and maintenance of portable electrical appliances. **(10)**

*The Guide to the NEBOSH International Diploma in Occupational Health and Safety
(February 2010 specification)*

- 3 Members of the public have been injured when collecting baggage from a baggage conveyor at an airport.
- (a) **Identify** typical *mechanical* hazards when the conveyor is in use. (4)
 - (b) **Outline** the control measures that should be in place to reduce the risk of injury from the *mechanical* hazards. (4)
- 4 Unless appropriate precautions are taken, chemical reactions in a batch manufacturing process can give rise to conditions that can lead to a 'runaway reaction'.
- (a) **Outline** what is meant by 'runaway reaction'. (2)
 - (b) **Identify** conditions that may give rise to such an event. (4)
 - (c) **Outline** the design and operational features of chemical processes that are necessary to prevent such an event. (4)
- 5 As Health and Safety Manager at a hazardous installation you are responsible for emergency planning. The site is regulated under the International Labour Organisation (ILO) Code of Practice 'Prevention of major industrial accidents' 1991.
- (a) In the event of an uncontrolled release, **outline** the need for emergency response measures. (4)
 - (b) **Outline** the general emergency planning measures that should be taken by the 'competent authorities' in association with the works management of the installation. (6)
- 6
- (a) **Identify** features of floor design that may help to reduce the risk of slipping. (4)
 - (b) **Outline THREE** methods of reducing the slip potential of the floor in use **AND** give reasons why **EACH** method would be effective. (6)

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** For a large supermarket with restaurant facilities:
- (a) **outline** the automatic fire protection systems that should be in place; **(6)**
 - (b) **outline** the factors to be considered when developing a safe means of escape for the supermarket. **(14)**
- 8** Outline measures that should be considered in order to help reduce risks associated with the movement of vehicles in a workplace. **(20)**
- 9** A small company manufactures products using electro-chemical processes. The company has poor general standards of health and safety, made worse by the presence of conductive and corrosive fluids and humid, corrosive atmospheres.
- (a) **Describe** the types of fault that may be found under such conditions in a fixed electrical system. **(10)**
 - (b) **Outline** the technical information a competent electrician would require before conducting an inspection of a fixed electrical system. **(10)**

- 10** The International Labour Organisation's Standard R175 and its associated Code of Practice sets out general principles for 'Safety and Health in Construction'.

Minor repairs need to be carried out to the sloping roof of a large two-storey property. A scaffold is to be erected in order to gain access to the work area.

Using the guidance in R175, **outline** the precautions necessary for carrying out the repairs. **(20)**

- 11** In relation to dust explosions:

- (a)** **outline** conditions that must be present for a primary dust explosion to occur; **(4)**
- (b)** **outline** additional conditions necessary for secondary explosions to occur; **(4)**
- (c)** **identify FOUR** key features of a nitrogen inerting system; **(4)**
- (d)** other than a nitrogen inerting system, **outline** design features that would minimise the risk of a dust explosion. **(8)**



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