

July 2015

Examiners' Report

NEBOSH International Diploma in Occupational Health and Safety (Unit C)



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NEBOSH INTERNATIONAL DIPLOMA IN OCCUPATIONAL HEALTH AND SAFETY

UNIT IC: INTERNATIONAL WORKPLACE AND WORK EQUIPMENT SAFETY

JULY 2015



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Introduction

NEBOSH (The National Examination Board in Occupational Safety and Health) was formed in 1979 as an independent examining board and awarding body with charitable status. We offer a comprehensive range of globally-recognised, vocationally-related qualifications designed to meet the health, safety, environmental and risk management needs of all places of work in both the private and public sectors.

Courses leading to NEBOSH qualifications attract around 50,000 candidates annually and are offered by over 600 course providers, with examinations taken in over 120 countries around the world. Our qualifications are recognised by the relevant professional membership bodies including the Institution of Occupational Safety and Health (IOSH) and the International Institute of Risk and Safety Management (IIRSM).

NEBOSH is an awarding body that applies best practice setting, assessment and marking and applies to Scottish Qualifications Authority (SQA) regulatory requirements.

This report provides guidance for candidates which it is hoped will be useful to candidates and tutors in preparation for future examinations. It is intended to be constructive and informative and to promote better understanding of the syllabus content and the application of assessment criteria.

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Any enquiries about this report publication should be addressed to:

NEBOSH
Dominus Way
Meridian Business Park
Leicester
LE19 1QW

tel: 0116 263 4700
fax: 0116 282 4000
email: info@nebosh.org.uk

General comments

Many candidates are well prepared for this unit assessment and provide comprehensive and relevant answers in response to the demands of the question paper. This includes the ability to demonstrate understanding of knowledge by applying it to workplace situations.

There are other candidates, however, who appear to be unprepared for the unit assessment and who show both a lack of knowledge of the syllabus content and a lack of understanding of how key concepts should be applied to workplace situations, which is an essential requirement at Diploma level.

This report has been prepared to provide feedback on the standard date examination sitting in July 2015.

Feedback is presented in these key areas; examination technique, command words and learning outcomes and is designed to assist candidates and course providers prepare for future assessments in this unit.

Candidates and course providers will also benefit from use of the 'Guide to the NEBOSH International Diploma in Occupational Health and Safety' which is available via the NEBOSH website. In particular, the guide sets out in detail the syllabus content for Unit IC and tutor reference documents for each Element.

Additional guidance on command words is provided in 'Guidance on command words used in learning outcomes and question papers' which is also available via the NEBOSH website.

Candidates and course providers should also make reference to the Unit IC 'Example question paper and Examiners' feedback on expected answers' which provides example questions and details Examiners' expectations and typical areas of underperformance.

Unit IC

International workplace and work equipment safety

Candidate performance

This report covers the examination sitting in July 2015.

Learning outcomes

Question 1

8.3 Outline the issues relevant to the installation, use, inspection and maintenance of electrical systems

This question concerned the specific syllabus requirement for 'safe systems of work and criteria of acceptability for live working'.

Candidates were expected to identify the conditions when it would be acceptable to work on equipment while it remained 'live'. This included circumstances where it is necessary to fault-find. In such cases it is sometimes not possible to do this when the equipment is 'dead'. 'Live' working is only acceptable once all suitable precautions have been put in place.

Many precautions can be taken including having properly trained and competent workers; operating under a permit-to-work scheme; using suitable and properly insulated tools and protective clothing; use of insulated barriers and screens; instruments and probes with insulated grips; control of any area where there is a danger from live conductors and so on.

Areas of weakness included misreading the question and providing answers such as 'isolation' and 'tag out' when the question was specifically about 'live' working.

Course providers and candidates need to focus on answering the question as it is asked and understanding criteria that have to be satisfied before 'live' working can be justified.

Question 2

6.7 Explain the analysis, assessment and improvement of system failures and system reliability with the use of calculations

This question assessed the two specific syllabus requirements within 6.7 to outline the meaning of the term 'system' and methods for improving reliability through minimising human error.

Candidates need to be able to define the term 'system'. They also need to understand the principles of system failure analysis including reductionist and holistic approaches. It is also important to be able to use data to calculate reliability. This includes calculating and using 'availability', 'mean time between failures (MTBF)' and 'failure rate' data.

There were two areas of weakness. Firstly, attempting to define a 'system' as if it were a 'system of work'. Secondly, being unable to put together coherent points giving the ways system reliability can be improved by minimising human error.

A common pitfall by candidates was a false belief that reliability was a Unit A topic, sitting alongside failure tracing techniques (such a fault tree and event tree analysis) in learning outcome IA4.4.

Learning outcome 6.7 covers the **specific** application of human error concepts to the reliability of systems. While there are complementary learning outcomes in IA7 'Human factors', these concern human factors **generally**.

Course providers and candidates appear to have overlooked this part of the syllabus and have wrongly compartmentalised it as a Unit A topic.

Question 3

11.4 Outline, the likely causes of the failure of pressure systems, and the testing and prevention strategies that can be used

This question concerned one of the mechanisms of mechanical failure that can lead to loss of containment, namely stress corrosion cracking.

Candidates need to appreciate that in order for stress corrosion to occur in pressure systems, a crack-promoting environment needs to exist. This can include overheating and operating above design temperature. The presence of tensile stresses is also necessary. Areas of stress concentration within systems are therefore especially vulnerable.

Certain chemicals cause specific materials to fail through stress corrosion. For example, chlorides in the presence of austenitic stainless steels and aluminium alloys. Also, nitrates in ammonia solutions can promote copper alloys to crack. Candidates need to appreciate that very small concentrations of the active chemicals can precipitate this form of corrosion.

Candidates generally had a weak understanding of stress corrosion as a mode of failure in pressure systems. Stress corrosion is an important topic, the phenomenon of stress corrosion does not just appear in pressure systems. It is well-known for example that the discovery of stress corrosion arose from failures of brass cartridges being affected by urea (containing ammonia) in stables. A more modern example is solvent-based paints affecting polycarbonate helmets and other personal protective equipment.

It was a common pitfall for candidates to provide answers that wrongly referred to environmental or bi-metallic corrosion, without thinking of the context of a pressure system.

This was a three-part question and candidates either omitted it in its entirety or repeated the same points in each part of their answers.

Learning outcome 11.4 is the very last item on the Unit C syllabus. It may not be a coincidence that pressure systems do not appear to have been studied to the same depth as other parts of the syllabus.

Question 4

2.1 Outline the properties of flammable and explosive materials and the mechanisms by which they ignite

2.3 Outline the main principles and practices of fire and explosion prevention and protection

This question concerned the properties of liquid petroleum gas stored under pressure and the fire precautions necessary for its safe storage.

The question covered two learning outcomes. Learning outcome 2.1 required candidates to understand the mechanism of fire and explosion that constitute a boiling liquid expanding vapour explosion (BLEVE). Learning outcome 2.3 required candidates to be able to apply to the scenario the concepts of segregation, structural protection, explosion relief and automatic fire detection and extinguishing systems.

Candidates provided good answers to this question and there were no identifiable areas of weakness or common pitfalls.

Question 5

3.2 Describe common fire detection and alarm systems and procedures

This question concerned two commonly used components in fire detection and alarm systems, namely heat and smoke detectors.

Candidates must be able to demonstrate a practical, as well as theoretical, understanding of how common fire detection and alarm systems work. This includes knowing how smoke and heat detectors operate.

There were no common areas of weakness apparent concerning learning outcome 3.2 in this sitting.

Some candidates were confused over which environments were suitable, and which were not, for the siting of heat and smoke detectors.

Question 6

1.1 Explain the need for, and factors involved in, the provision and maintenance of a safe working environment, with specific reference to access and egress, pedestrians, and slips, trips and falls

Within learning outcome 1.1, the syllabus includes 'slip resistant testing of footwear and surfaces'.

Slips are a common cause of accidents at work. Their prevention and analysis are therefore an important part of a health and safety practitioner's role. The expectation is that this topic is one with which most candidates would be familiar.

Testing of slip resistance is part of the analytical work that needs to be conducted, whether it be to advise on new or proposed surfaces or surface treatments or to investigate incidents where slips have occurred.

Candidates are expected to be able to demonstrate a practical and theoretical knowledge of different coefficients of friction (CoF) between one surface and another, the effects of contamination on CoF, the effects of cleaning floors, the appropriateness of footwear for the working environment and practical methods for managing the risks of slips at work.

Many candidates did not understand the meaning of a 'coefficient of friction' and were rarely able to discuss more than one method of assessing slip resistance.

Course providers and candidates need to look at a range of methods including pendulum, sled and surface roughness tests. For the reasons already described, commissioning such tests and interpreting their results are important practitioner skills.

Question 7

7.1 Describe the main hazards and control measures associated with commonly encountered mobile work equipment

10.1 Explain the hazards, risks and control measures for safe workplace transport operations

This question concerned the safety of off-road, telescopic materials handlers. Learning outcome 7.1 in the syllabus specifically refers to different types of self-propelled, mobile work equipment and includes lift trucks, telescopic materials handlers, side-loaders, agricultural tractors and works vehicles.

Learning outcome 10.1 complements this and refers to typical general hazards found in workplace transport. It also refers to non-movement hazards (such as loading, unloading and securing loads, as well as control measures for safe workplace transport operations).

In this sitting this learning outcome concerned the specific hazards of telescopic materials handlers. Candidates had to identify what those were and included forward blind spots from the boom, poor rearward visibility, tipping and bucket overloading, contact with high voltage cables and so on.

Parts (b) and (c) concerned safe operation of telehandlers. Safe workplace transport safety is founded on having a number of elements present. Namely, a safe site, safe vehicles and safe drivers. This question examined candidates on two of these factors.

For safe sites, Examiners were expecting to see some understanding of the off-road aspects referred to in the question stem. Adequate surface for grip, sufficient height and width and cambers were all considerations here. A safe vehicle required candidates to think about factors including suitability for task, load capacity and safe working load, using suitable implements, being properly maintained and with suitable driver visibility aids.

The main weakness was not reading the question and taking heed of the 'off road' applications demanded in the question. A minority of candidates were unaware of what a telescopic material handler was and confused it with a mobile extending work platform (MEWP)/scissor lift.

Course providers and candidates need to note that the syllabus refers to 'commonly encountered' mobile work equipment and that the requirement is a broad one. Questions concerning lift trucks, side loaders, shovel loaders, aircraft tugs and dumper trucks are all examinable.

Question 8

9.3 Explain the hazards associated with working at heights from fixed work or temporary platforms and the necessary precautions and safe working practices

This question was based around the scenario of a contractor using a rope access system to clean the windows of a tall office building.

Learning outcome 9.3 is clear and includes 'the use, application and precautions in use of personal and collective fall arrest devices (safety nets, airbags, belts and harnesses)'. It also includes 'the means of temporary access types and safety features of...rope access and positioning systems'.

It was a fundamental weakness that candidates did not understand what a rope access system was. Neither did they understand its essential component parts. Without those two key pieces of knowledge, it was then very difficult for candidates to answer this question competently.

This was an unpopular question with candidates, with low marks for those that did attempt it. The impression amongst Examiners was that candidates were unprepared for this learning outcome. This would suggest that both course providers and candidates need to consider it both during their formal taught sessions and during their directed study.

Question 9

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

This question concerned driving at work and was in three parts. The first part required candidates to outline the factors that might contribute to work-related driving risk; the second to identify when driver training may be required; and the third to outline the content of a driver training programme.

Learning outcome 10.2 specifically covers the factors that increase the risks associated with driving at work. These factors include distances being driven, driving hours, work and delivery schedules, stress due to traffic, weather conditions, etc. Most candidates were able to handle this learning outcome competently.

Areas of weakness were around the content of a training programme for new drivers, with many candidates simply citing 'basic', 'specific', 'familiarisation' and 'refresher' training. The command word 'outline' requires more than this in an answer. Candidates must be able to provide an answer in the context of the question (which was not a forklift truck question).

Course providers and candidates need to recognise this was a 'driving at work' question. Candidates seemed to limit their answers to the transport safety issues on a particular enclosed site.

Question 10

11.3 Outline the key features and safety requirements for process pressure systems

11.4 Outline, the likely causes of the failure of pressure systems, and the testing and prevention strategies that can be used

6.4 Explain the principles of control associated with the maintenance of general workplace machinery

This question was based around the scenario of a pressurised steam boiler requiring examination. At the same time a repair on an electric pump was also needed.

Learning outcome 11.3 requires candidates to know important definitions in relation to pressure systems and to understand what the key components of pressure systems are. Although 11.4 is entitled 'failure of pressure systems' it also covers prevention strategies, that incorporates (among other things) repairs and written schemes of examination.

Learning outcome 6.4 concerns maintenance of work equipment generally. This includes the means by which machines (pumps) are set, cleaned and maintained. It covers isolation and the means by which machines (pumps) are isolated from all energy sources.

Most candidates who attempted this question were able to demonstrate an understanding of learning outcome 11.3. Fewer were able to outline the contents of a written scheme of examination. The most understood of the three learning outcomes was 6.4 with many competent answers.

Pressure systems generally are a weakness for many candidates.

As has been mentioned previously in relation to Question 3, course providers and candidates need to concentrate their efforts more on Element 11: Pressure system hazards and control.

Question 11

2.1 Outline the properties of flammable and explosive materials and the mechanisms by which they ignite

4.2 Outline the main principles of the safe storage, handling and transport of dangerous substances

This question concerned filling a road tanker with petroleum. It was in three parts, hazards associated with the filling operation, how a vapour cloud explosion could form and suitable control measures for the filling operation.

The safe transport of dangerous substances requires an understanding of the hazards associated with that substance. In the case of petroleum those are well-known and understood by the majority of candidates. Likewise, the potential for a vapour cloud explosion was well-understood.

Part (iii) was more challenging to most candidates and required an understanding of the many control measures that can be used to control filling risks. These included having pumps and hoses that were fit for purpose and properly maintained, overfill prevention, specific entry and exit routes, avoidance of splash filling and so on.

It appeared to Examiners that some candidates had rote-learned answers to this question. Examiners are keen to discourage the practice by some candidates of attempting to rote-learn answers to previous questions.

Examination technique

The following examination techniques were identified as the main areas of improvement for candidates:

Candidates misread/misinterpreted the question

It seems to be a particular shortcoming, that when faced with new questions that candidates do not read the question properly. This is particularly apparent for new questions here candidates tend to provide answers to the question that they might like to have answered, or had anticipated, rather than answering the questions as set.

Examiners ask questions based on the syllabus. Points, no matter how valid, but unrelated to the question being asked, will not attract any marks. Candidates should note that where there is emphasis in a question (eg by the use of italics) it is to guide candidates towards a particular point. Reading and re-reading the question encompasses taking due note of this emphasis.

Candidates' handwriting was illegible

While this is not an examination in handwriting, Examiners do need to be able to read the scripts presented to them. In an increasingly electronic age, professional people do not have the same need to write text in longhand. However, to pass this examination it is an essential and necessary part of the preparation to rehearse writing questions in full and in the time allocated.

Course providers need to identify those candidates whose handwriting is illegible and provide them with appropriate advice. Examiners cannot award marks for answers that they are unable to read.

Candidates repeated the same point but in different ways

Candidates often repeat the same point within their answers for which marks can only be awarded once.

Command words

The following command words are listed in the order identified as being the most challenging for candidates:

Explain

Explain: To provide an understanding. To make an idea or relationship clear.

Many candidates are still not properly prepared for this examination. A list of points (no matter how relevant) will not satisfy Examiners when the command word is 'explain'. So for example, on Question 5, candidates were asked to explain the circumstances where heat and smoke detectors would be inappropriate. Examiners were looking for candidates to explain that heat detectors would be inappropriate in environments where temperatures fluctuate suddenly during normal work activities. Just saying 'workshops', for example, is not enough to provide an answer to an 'explain' question.

Outline

Outline: To indicate the principal features or different parts of.

There is consistent feedback from Examiners that a significant proportion of candidates still fail to understand that 'outline' requires more than just writing down a list of relevant points.

Give

Give: To offer for the consideration, acceptance, or use of another.

Most candidates understood how to respond appropriately to this command word.

Identify

Identify: To give a reference to an item, which could be its name or title.

Most candidates understood how to respond to this command word.

For additional guidance, please see NEBOSH's 'Guidance on command words used in learning outcomes and question papers' document, which is available on our website: www.nebosh.org.uk/students/default.asp?cref=1345&ct=2.

Conclusion

The feedback from Examiners highlighted that candidates taking the Unit IC examinations in July 2015 needed most improvement in the areas of work at height and rope access systems (learning outcome 9.3); systems failures and system reliability (learning outcome 6.7); and pressure systems generally (learning outcomes 11.1 and 11.4).

The syllabus asks for an understanding of the practical applications of different types of machinery and equipment (work equipment, machines, pressure systems). Without an appreciation of how these pieces of equipment operate (whether it is pressure systems or vehicles and machinery used at work) candidates are unable to understand the requirements for their safe operation.

With regard to examination technique, candidates sitting this examination should practice and get an objective assessment of their handwriting skills; read the question and answer what has been asked rather than what they would like to have been asked; read and review the syllabus as part of their preparation for this examination.



nebosh

The National Examination
Board in Occupational
Safety and Health

Dominus Way
Meridian Business Park
Leicester LE19 1QW

telephone +44 (0)116 2634700

fax +44 (0)116 2824000

email info@nebosh.org.uk

www.nebosh.org.uk