

# Example question paper and Examiners' feedback on expected answers (IB)



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**Example question paper and  
Examiners' feedback on  
expected answers**

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



**UNIT IB:  
INTERNATIONAL CONTROL OF  
HAZARDOUS AGENTS IN THE WORKPLACE**

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# Introduction

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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 exams taken in over 110 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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## 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 always some 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.

Course providers and candidates will 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 IB and tutor reference documents for each Element.

Some candidates may over rely on knowledge of health and safety gained through their own work experience. While practical experiences can sometimes be helpful they are not a substitute for tuition and study of the syllabus content, to the breadth and depth indicated in the Guide referred to above.

In order to meet the pass standard for this assessment, acquisition of knowledge and understanding across the syllabus are prerequisites. However, candidates need to demonstrate their knowledge and understanding in answering the questions set. Referral of candidates in this unit is invariably because they are unable to write a full, well-informed answer to one or more of the questions asked.

Some candidates find it difficult to relate their learning to the questions and as a result offer responses reliant on recalled knowledge and conjecture and fail to demonstrate a sufficient degree of understanding. Candidates should prepare themselves for this vocational examination by ensuring their understanding, not rote-learning pre-prepared answers.

Candidates should therefore note this Report has not been written to provide ‘sample answers’ but to give examples of what Examiners are expecting and more specifically to highlight areas of underperformance.

### **Common weaknesses and suggestions to assist providers and candidates**

It is recognised that many candidates are well prepared for their assessments. However, recurrent issues, as outlined below, continue to prevent some candidates reaching their full potential in the assessment.

#### **Weakness in examination technique**

- Many candidates fail to apply the basic principles of examination technique and for some candidates this means the difference between a pass and a referral.
- Candidates need to plan their time effectively. Some candidates fail to make good use of their time and give excessive detail in some answers leaving insufficient time to address all of the questions.
- In some instances, candidates do not attempt all the required questions or are failing to provide complete answers. Candidates are advised to always attempt an answer to a question even when the question is on an unfamiliar topic. At the risk of stating the obvious, an unattempted question will gain no marks. Questions or parts of questions missed can also indicate a weakness in time management.
- Some candidates fail to answer the question set and instead provide information that may be relevant to the topic but is irrelevant to the question and cannot therefore be awarded marks. The comment below about rote learning may be relevant also.

- Some candidates fail to separate their answers into the different sub-sections of the questions. These candidates could gain marks for the different sections if they clearly indicated which part of the question they were answering (by using the numbering from the question in their answer, for example). Structuring their answers to address the different parts of the question can also help in logically drawing out the points to be made in response.

Candidates benefit from the chance to practice answering questions in examination like conditions. This should assist them to become familiar with the need to read questions carefully, consider, plan their answer and then begin to write. By examination like conditions, practicing their answers within appropriate time limits should help candidates with time management within the examination.

Feedback to candidates on their answers to questions is a key part of these practice activities.

### **Lack of attention to command word**

- Many candidates fail to apply the command words (eg describe, outline, etc). Command words are the instructions that guide the candidate on the depth of answer required. If, for instance, a question asks the candidate to 'describe' something, then few marks will be awarded to an answer that is an outline. Similarly, the command word 'identify' requires more information than a list.
- The most common weakness is the provision of too little content in an answer to meet the requirement of the command word. This is an unfortunate error as it can mean that a candidate, who knows the topic, and correct points to include in their answer, misses out on marks.

There is good guidance available to candidates and providers "Guidance on command words and question papers" which can be accessed on the NEBOSH website. This guidance will assist candidates to see and understand what is required in an answer when the different command words are used in questions. Some candidates miss out on marks by spending too long writing about one or two points when the answer requires more points to be covered. The chance to practice questions with a range of command words and to receive feedback on the quality of their answers will benefit candidates.

### **Rote learning**

- Some candidates appear to have answered a question they hoped to see in the question paper rather than the question actually asked. This error can lead to all the available marks for a question being missed, with the consequent impact on the likelihood of reaching a pass standard.
- The weakness described can be due to rote learning but may also relate to the need to read and consider the question commented upon above.

### **Other weaknesses observed**

- Candidates should also be aware that Examiners cannot award marks if handwriting is illegible.
- Candidates should note that it is not necessary to start a new page in their answer booklet for each section of a question.

## UNIT IB – International control of hazardous agents in the workplace

### Section A – all questions compulsory

**Question 1** *Safety Data Sheets (SDSs) provide important information to employers who are required to assess exposure to hazardous substances in their workplace. A typical SDS is divided into sections that contain different types of information.*

***Identify FIVE** different types of information contained in a SDS, **AND** for **EACH**, **outline** how the information could contribute to the assessment of risk or control of exposure.*

**(10)**

In answer to this question, Examiners expect candidates to identify five different types of information. A very wide range of types of information are acceptable. The range of types is important; credit cannot be given for items that are very similar. Candidates generally have no real difficulty identifying five items but sometimes struggle to select from a range or connect them with their contribution to risk assessment. A good strategy here is to think about the section headings on a typical SDS and choose from five of these, bearing in mind the second part of the question. It is important to realise that to gain maximum marks, each type of information had to be tied to its contribution. Not all information on a SDS is directly useful in risk assessment, so there is little point in choosing a type of information and then struggling to think about how it might be used in risk assessment. Examiners are therefore expecting candidates to select from items such as: details of the manufacturer of the substance (such as emergency contact information) so that the user might make contact with them in the case of an emergency; information on the physical properties such as its volatility/dustiness for example which will help assess how likely it is to be inhaled; health hazard information on the substance, such as whether it is toxic, corrosive or an irritant and the target organs which will indicate directly the type of harm; the appropriate first aid measures to be taken in the event of contact which may indicate specific training or treatments; the precautions to be taken when handling or storing the substance (segregation); the control measures to be taken depending on the likely level of exposure such as the provision of local exhaust ventilation or specific personal protective equipment; regulatory information such as the exposure limit of the substance, which provides a standard against which to assess the likely significance of workplace exposure; considerations to be taken when disposing of the substance; and other relevant information such as those concerned with possible environmental damage or fire.

**Question 2** (a) ***Identify** the possible health effects from working in a cold store at sub-zero temperatures.*

**(4)**

(b) ***Outline** control measures to minimise the risks to persons who work in a cold store at sub-zero temperatures.*

**(6)**

Candidates usually have little difficulty with the first part of the question. Examiners expect candidates to identify any four items which could be chosen from: cold strain (difficulty in maintaining the core body temperature); a reduction in the heart rate or breathing rate; persistent shivering together with blue fingers and lips; mental impairment and stress; hypothermia; frost bite involving inflammation of the skin and tissue damage; and chilblains causing redness, tingling and pain in the affected area.

For the second part of the question, many candidates tend to limit their answers (and so their marks) to consideration of job rotation and training. These are relevant but it is important to realise there are far more. Examiners also note that some candidates persist in specifying 'training' in general, without indicating in what. To gain marks, candidates are expected to outline that workers would need instruction and training in the hazards, risks and controls of working in such conditions.

Control measures which help to minimise the risk to workers include pre-employment examination with subsequent continuing health surveillance; the provision and wearing of thermal clothing such as undergarments, insulated suits or jackets, gloves and footwear; continuous monitoring of the level of activity (which should be sufficient to generate some heat but not high enough to cause workers to sweat); placing a restriction on the time spent working in the cold store with the provision of regular breaks in a warm environment; ensuring that there is no possibility of workers being locked in the store such as the provision of means for opening doors on the inside of the store; ensuring protection is provided against leaks of refrigerant gas such as a programme of regular maintenance together with a detection and alarm system; the provision of facilities for drying thermal clothing and for its replacement when necessary; and giving instruction and training to workers on the hazards involved in working in the cold store and the precautionary measures that they should take.

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**Question 3**     *Operators use a range of solvents in a manufacturing process.*

**Describe** a monitoring strategy that could be used to measure the exposure of the operators to solvent vapours. **(10)**

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This question is generally quite poorly answered. Many used a hierarchy of control approach which is not relevant. Some mistake this question to be about health surveillance rather than solvent vapour exposure monitoring.

Examiners advise that a logical and structured approach would be to use the three stage strategy from HSG173. Some candidates are clearly familiar with this and take each stage in turn and describe the circumstances in which it would be appropriate to use that type of monitoring, and the methods and equipment that could be used. The first stage would take the form of an initial appraisal with the objective of determining if and to what extent more detailed monitoring of workers' exposure would be required. It is basically an exercise to gather information on matters such as the activity being carried out, the substances in use, the duration of exposure, relevant exposure limits and the nature and use of any existing controls, which would inform the decisions to be made on who, where, when, for how long and what to monitor. If the initial appraisal were to indicate that there would be significant exposure, a basic survey would be necessary. A number of measuring methods could be used ranging from the use of a pump with adsorption and/or stain tubes to direct reading instruments. It might also be necessary to take samples either on a personal or static basis, and either for the short or long term with the samples being analysed using a method such as gas chromatography or mass spectroscopy. Finally, biological monitoring could be used to measure what has actually been taken into the body rather than the airborne concentration.

To gain maximum marks it is important to describe in sufficient detail. For example, when describing analysis of the vapour after sample collection, an indication of a suitable method is expected.

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**Question 4** *A research laboratory undertakes necessary work with biological agents. These biological agents are categorised as extremely hazardous, being placed in the highest hazard group.*

**Outline** *a range of technical controls that should be used to minimise the risks to those working in the laboratory, where elimination or substitution of the hazard is not possible.*

**(10)**

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In answering this question, Examiners expect candidates to outline technical control measures such as: the separation of the laboratory from other activities in the same building; input and extracted air to be passed through a HEPA (high efficiency particulate air) filter; access via an airlock to be restricted to authorised persons by means of a security pass or swipe card; the workplace to be sealable to permit disinfection and to be maintained at an air pressure negative to atmosphere; all surfaces to be impervious to water, easy to clean and resistant to acids, alkalis, solvents and disinfectants; secure storage to be provided for the biological agents; an observation window (or alternatively, CCTV) to be fitted so that the occupants can be seen at all times; a microbiological safety cabinet with sealed front and glove port access to be used to carry out the work; a facility such as an autoclave to be provided for rendering waste safe and finally the provision of appropriate and adequate hand washing facilities.

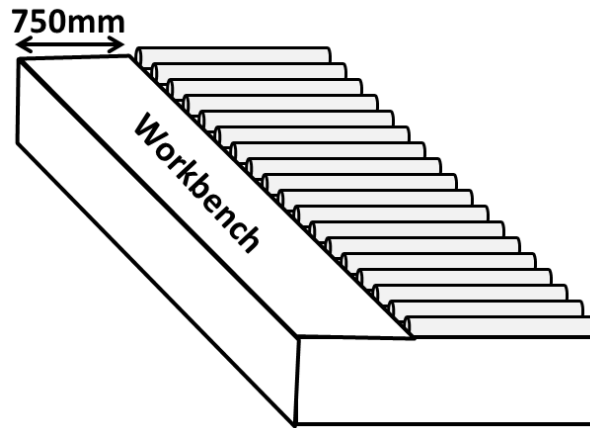
A range of answers are generally provided for this question with some candidates showing a good understanding of laboratory work and others none. Some are confused with the specific terms that should be used, for example, referring to biological rather than microbiological cabinets whilst others do not appreciate where HEPA filters should be fitted. Some concentrate on behavioural or procedural rather than the technical controls which are required. As a result, no marks are available for signage, procedures for restricting access for authorised persons, procedures for handling samples, training, PPE, and the restriction of eating/drinking.



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**Question 5**

A worker on a production line is required to stand in front of his workbench, which is 750mm deep and set at waist height. The worker must frequently lift a 20kg item of equipment from his workbench onto an unpowered roller conveyor which is behind it. The conveyor is set slightly higher than the workbench (see diagram).



- (a) **Explain** why the current method of working is not acceptable. (4)
- (b) **Outline** practical measures that might be considered to reduce the ergonomic related risk to the worker. (6)
- 

A diagram is provided for this question to help convey the scenario better. Part (a) of the question requires candidates to analyse the scenario and provide reasons why the practice needed to change. Examiners expect candidates to deduce that the degree of stooping and bending required coupled with the need to handle loads away from the body will increase stress to the lower back, with the frequency of the operation increasing the risk with the result that injury, particularly to the back, would be caused. There are several marks available for candidates who provide more detail about the issue of handling loads at arm's length, such as the fact that it imposes around five times the stress and the 20kg load size exceeds the good practice guidelines. However, few candidates are able to provide this level of detail.

Measures that could be taken to reduce the risk to the worker include reducing the weight of the load; providing a mechanical device such as counter balanced lifting arm to move the equipment onto the roller conveyor; re-arranging the work station so that the conveyor is at the side of the bench enabling the equipment to be slid onto the rollers; reducing the depth of the work station to reduce the distance the load has to be lifted away from the body; and the possibility of introducing job rotation together with the provision of frequent breaks for the operators. There are some creditable attempts made at answering this part of the question where candidates consider the redesign of the workstation. However, it is seldom that an outline is provided and although reference is made for example to the use of a mechanical device there is no attempt made to specify what it should be or how it could be used.

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**Question 6**

*Construction workers regularly use cement. Several of the long-term workers and one of the new recruits have complained about red and sore skin on their hands.*

- (a) **Explain** the possible reasons for the symptoms they are experiencing. (6)
- (b) **Outline** control measures that could be used to minimise these symptoms in this situation. (4)
- 

Examiners expect candidates to realise that the symptoms are consistent with the workers suffering from dermatitis caused by a chronic or repeated exposure to an irritant or irritants. Some candidates are certainly aware that cement is a known irritant but which can also cause allergic contact dermatitis due to the presence of chromium VI compound impurities in the material. These candidates go on to describe that contact with a sensitiser produces an over-reaction from the body's immune system. Sensitisation can occur on first contact such as with the new recruit or after some time in the case of the long term workers. The effect of contact with the irritant/sensitiser can also de-fat and degrease the skin. Credit is also given to candidates who note that dermatitis is not the only possible contributor to the symptoms. The symptoms could also be caused by caustic burns whilst friction and abrasion from general floor laying and a failure to protect the hands with gloves and a good standard of personal hygiene will not help the condition. Most candidates provide good answers for this part of the question although only a few refer to the possibility of caustic burns or friction. A few do not read the question with sufficient care and do not relate their answer to the use of cement. Examiners are happy to accept a range of different terminologies for the different dermatitis conditions and causative agents, which reflects their use.

For part (b), candidates could outline control measures that could be used to minimise the symptoms such as using a non-cement based levelling compound, for example, a polymeric compound; wearing gloves to protect the skin and minimising contact by the use of hand tools; providing washing facilities so that contaminants can be washed from the skin as soon as possible with the hands dried thoroughly after washing; using pre-work and after work moisturising creams to replenish the natural oils in the skin; giving information to the workers on the hazards of using the material and the precautions that should be taken and encouraging them to report any problems with their skin; and arranging for supervisors to carry out regular skin inspections of the workers. Answers to this part of the question are generally to an acceptable standard with many candidates outlining most of the above control measures.

**Section B – three from five questions to be attempted**

- Question 7** *A slightly corrosive solution is used as a treatment in part of a manufacturing process. The solution is applied by hand brushing. For this process, other methods of application are not practicable.*
- (a) **Outline** the factors that should be considered in the selection of personal protective equipment to adequately protect the skin and the eyes of those involved in the process. (10)
- (b) **Outline** the content of a training programme that will assist workers to use the personal protective equipment correctly. (5)
- (c) **Identify** a range of practical measures (other than training) that can be taken to encourage the use of the personal protective equipment and maintain its effectiveness. (5)

For part (a) of the question, good answers are framed around a logical approach which outlines the specific factors to be considered in the selection of personal protective equipment firstly for the hands, then for the face and eyes and finally for the rest of the body. Examiners appreciate that some factors apply to all forms of protection. For the selection of protective gloves, relevant factors are the chemical breakthrough time (compared to the time for which the glove would be worn); the level of dexterity required for the task; the length of the glove required to afford adequate protection; the durability of the gloves; the need to ensure that a suitable range of sizes is available for the various users; and any worker allergies to the glove material or any other skin problems.

In the selection of eye protection, relevant factors are the risk of splashing the face as well as eyes; the provision of advice on the use of goggles or a face shield (rather than glasses); and their compatibility with other protective equipment if this is required.

In the selection of body protection, Examiners expect candidates to refer to aprons and/or overalls and appropriate footwear. Better answers conclude by considering factors which applied to all the PPE, such as findings from consultation and user trials; comfort of the equipment; that all personal protective equipment provided met the appropriate national or international standards and that everything purchased possessed the appropriate resistance to the corrosive solution in question.

Good answers to the second part of the question identify that workers should receive training in topics such as: the health risks of the chemical in use; the type of personal protection to be used and the reason for its use; the methods to be used for putting on and taking off the equipment without causing contamination including decontaminating or discarding gloves after use; the methods of examining the equipment for damage or degradation, particularly gloves, and for reporting defects and obtaining replacements; how to store the equipment correctly and finally how to carry out self-examination of the skin and the action to be taken if problems are to occur.

For part (c), Examiners expect candidates to identify practical measures such as: management leading by example; workers being involved in the selection of the equipment; ensuring the availability of a range of sizes in gloves and fully adjustable face shields; ensuring workers are required to sign for their equipment and maintaining records of issue; issuing the equipment on a personal basis and providing adequate storage facilities; using propaganda, signs and posters and incentive schemes; monitoring compliance in the use of the equipment with a recognised code of discipline for non-use; and finally monitoring the effectiveness of the equipment issued and replacing it with an alternative type if problems are encountered.

There are generally good answers provided for this question with many candidates seeming to be well prepared.

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- Question 8**     *Managers are concerned at the increase in stress-related absence.*
- (a)     **Identify** a range of information sources that can be used to assess the levels of stress experienced by their workers.     **(6)**
- (b)     **Outline** organisational and personal factors that can contribute to the incidence of work-related stress.     **(14)**
- 

Candidates who chose to answer this question generally have little difficulty with part (a). A wide range of information sources can be cited. Candidates are expected to identify six items from: sickness or absence data; health surveillance data; information available from performance appraisals, records of return to work interviews; discussions at safety committee meetings and team briefings; reports following the investigation of accidents; records of complaints; the rate of staff turnover as well as the information provided at exit interviews; information from informal discussions with workers or with members of management who have been trained in assessing the risk or presence of stress; information gained from specific surveys and questionnaires and, finally information available in external guidance and standards (such as the stress management standards).

For part (b) Examiners do not require candidates to separate out organisational and personal factors (which might sometimes be difficult to fully distinguish). They could be considered collectively and still gain marks. However, Examiners did require a consideration of factors that influence stress and not control measures for stress. Some candidates choose to outline the latter and so gain few marks. Many appear to outline only a narrow range of factors and also gained few marks as a result.

Organisational factors that may contribute to the incidence of work-related stress include organisational change with the resultant uncertainty and threat of redundancy; work overload or conversely under-load; unrealistic deadlines or targets which often demand an unreasonable pace to complete the work; long work hours and/or difficult shift patterns resulting in a poor standard of work-life balance; a lack of consultation with workers on work planning; uncertainty over the role or objectives of the job often caused by a lack of training; the absence of a system for raising concerns and grievances and even when one is in existence, a failure to address the issues that are raised; poor working relationships with managers or colleagues and the presence of bullying, harassment, violence and aggression; and a poor working environment, often causing a feeling of isolation from colleagues, whether physical or psychological. To the above must be added the inevitable personal factors such as bereavement, divorce, child care issues and caring responsibilities.

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**Question 9**

*A small printing company operates a number of printing machines which are located in an open-plan workshop. Following a noise survey, the company discovers that their workers are being exposed to high average daily noise levels. The noise levels exceed regulatory exposure limits.*

(a) **Describe** the acute and chronic physiological effects of exposure to high noise levels on the individual. (4)

(b) **Explain** what steps the company should take to protect workers. (16)

*In your answer clearly explain the range of technical and organisational control measures that could be introduced.*

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In answer to part (a), candidates are expected to describe effects such as tinnitus (ringing in the ears) which may be chronic or acute, temporary or permanent threshold shift and noise induced hearing loss resulting in a loss of sensitivity to sounds in the speech range. This part of the question is generally poorly answered with many candidates showing little awareness of the physiological effects of exposure to high noise levels or at least providing too little detail to gain marks. Since the question specifically asks for physiological effects, psychological effects (such as stress) are not relevant.

For part (b), Examiners expect candidates to refer to the need to reduce exposure primarily by means other than the provision of hearing protection and describe technical controls such as: replacing older/noisier equipment with machines that emitted lower levels of noise; isolating the noisier machines in a separate area of the workshop and building a noise enclosure of suitable noise attenuating material around them; mounting the noisy equipment on rubber strips or dampers; lining the walls and floor of the workshop with acoustically absorbing material and applying damping to metal panels on machines; and creating a noise haven for the workers. If, even after taking the above measures, the provision of hearing protection is found to be necessary, it should be chosen based on an octave band analysis measurement of the noise emitted in order to provide the best overall reduction in exposure.

Organisational controls include reducing exposure times by job rotation; designating hearing protection zones; providing training to workers on the risks associated with exposure to noise and on the fitting and maintenance of hearing protection; ensuring hearing protectors, once issued, are used and introducing disciplinary procedures to deal with those workers who do not wear them. Establishing a maintenance regime for equipment is also relevant.

Answers provided are generally very limited and Examiners are concerned at the apparent lack of technical knowledge of the subject. For example, when reference is made to the provision of hearing protection there are but few who added that it should be chosen only after an octave band analysis measurement of the noise emitted had been carried out. Just identifying that hearing protection is required, without explanation, does not merit a mark.

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**Question 10** *A large manufacturing company is to introduce a health promotion programme.*

- (a) **Outline** the purpose of a health promotion programme. (2)
- (b) **Identify** issues the health promotion programme should address **AND outline** the way in which **EACH** issue could be promoted. (10)
- (c) **Identify FOUR** occupational health specialists who may be involved in the health promotion programme, **AND outline** how **EACH** specialist could contribute to the programme. (8)
- 

This question is generally not popular and few candidates attempt it. For part (a), Examiners expect candidates to outline either that a health promotion programme is designed to help workers to improve their own general health and well-being or to improve the health and well-being of people at work through the combined efforts of employers, workers and society.

For part (b), Examiners expect candidates to identify up to ten issues and include an outline of the way they could be promoted. For example, the programme could address the general issue of health awareness by using posters and notice boards to link the promotion with national health awareness days. Similarly the issue of well-being at work could be promoted by offering the possibility of working flexible hours or working from home while the subject of healthy eating could be supported by making information available on diet and nutrition and by changing the menu of the works canteen to include the suggested healthy foods. Other issues such as smoking, the consumption of alcohol and the need to take exercise could again be promoted by the use of posters, videos and leaflets whilst workers might be encouraged to engage in exercise if membership of a local gymnasium could be arranged at preferential rates. In order to obtain all the marks available candidates should also identify other issues such as health monitoring, the benefits of vaccination and/or inoculations, counselling and individual factors such as ageing or pregnancy and considered how they might be promoted to gain the desired effect.

In answer to part (c), an identification of four occupational health specialists who might be involved in and contribute to a health promotion programme is required. For example, an occupational health physician would be competent to deal with occupational health problems and might refer workers for specialist consultation when this is thought to be necessary while an occupational hygienist could assist in preventing ill-health from work by anticipating, recognising, evaluating and helping to control health hazards. Other specialists who could have been mentioned include an occupational health nurse, a physiotherapist, an ergonomist and a dietician but in each case their possible contribution to a health promotion programme should have been outlined before marks could be awarded. This part of the question generally attracts better answers than the preceding two with the required number of specialists identified together with the contributions they could make to the health promotion programme.

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- Question 11** (a) **Identify FIVE** workplace sources of ionising radiation. (5)
- (b) **Outline** control measures that should be in place when persons may be exposed to ionising radiation at work. (15)
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In answer to part (a), Examiners expect candidates to identify five sources such as the use of non-destructive testing (NDT) equipment; the medical/dental use of x-rays; re-processing nuclear fuels and the presence of radio-active isotopes in nuclear power stations; the presence of ionising radiation albeit in small quantities for instance in smoke detectors and luminous articles; and the use of ionising radiation for process measurement and control and in laboratories for research projects. Candidates generally have difficulty with this part of the question frequently identifying types of ionising radiation as opposed to their workplace sources. There still remains confusion in some minds between ionising and non-ionising radiation.

Control measures that should be in place where persons may be exposed to ionising radiation at work include limiting the time of exposure with the exclusion of particularly vulnerable groups such as young persons and pregnant women; the use of sealed sources or those of lower intensity whenever possible; increasing the distance between the radiation source and those at risk to reduce the level of exposure; using shielding such as lead, concrete or plastic between the radiation source and those likely to be exposed with the amount of shielding required dependent on the energy of the source; by containment and enclosure such as with the use of glove boxes; prohibiting eating and drinking in areas in unsealed radioactive areas together with the need for a high standard of personal hygiene to prevent spread and the covering of all breaks in the skin with protective material; the provision, use and laundering of personal protective equipment such as gloves, lab coats and over shoes; the availability of competent advice from a Radiation Protection Adviser or Supervisor and the provision of training and information to workers on the health risks involved and the control measures to be applied; the preparation of plans to cope with any emergency; personal monitoring by means of film badges; regular monitoring of the work area for example by means of a Geiger counter and ensuring the safe disposal of all contaminated materials.

Answers to this part of the question are generally acceptable although few candidates demonstrated knowledge of the broad range of control measures expected at Diploma level.



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