

## **Short Answer Questions**

### **1. Introduction**

*To improve the examination system for all candidates, a decision has been taken to change from multi-choice questions to short answer questions, without negative marking (i.e. candidates will not be penalised for a wrong answer). This is planned to take place 1 November 2009.*

*Candidates will no longer be able to just choose their answer from a pre-printed list, they will be expected to know it. The examination will, therefore, be a much better test of candidates' knowledge.*

*The change has also made question writing more straight forward. However, great care in the wording has still been taken to direct the candidate to the expected answer.*

*Because the examination technique for short answer questions is quite different to that for multiple choice questions, course tutors will need to modify their examination preparation of candidates (see Section 3).*

*Four marks are allocated to each question which may be split amongst the answer, or, in some cases there is a single answer which will gain the full fourmarks. In other cases the basic answer will be awarded two marks and supplementary answers can gain a further two marks.*

***The pass mark for all examinations will be 50%.***

*We are not expecting these changes to alter the time scale for results publication (i.e. Proficiency Module results should still be issued in four weeks and Occupational Hygiene Modules results in six weeks..*

*All examination papers will have been through a three stage quality assurance process before being authorised for use.*

### **2. Example questions with marking schedule**

In order for providers to see what the questions with their marking schedule will look like, a few examples are given below. These are, however, examples only and they are most unlikely to appear in actual examination papers. The number in parenthesis (i.e. [2]) indicates the number of marks for that question/part of the question.

<b>Question</b>	<b>Marking schedule</b>
Which form of asbestos is more prevalent in Asbestos insulating board (AIB), used as ceiling tiles?	Amosite [4]
How much asbestos and what type(s) would typically be found in corrugated asbestos cement sheets?	10 – 15% [1] Chrysotile [2] (sometimes Crocidolite/Amosite may be found [1])
According to MDHS100, what type of asbestos would you find in Caposite thermal insulation?	Amosite [4]
Which type of asbestos is NOT classified as an amphibole?	Chrysotile [4]
During removal of sealed asbestos lagging insulation can you use controlled wetting with a water spray only? Justify your answer	No [1]. Should use water injection to ensure complete wetting before removal [2] spray wetting only wets the exposed surface. [1]
According to HSE Guidance Note HSG247 how many	8 [4]

air changes per hour should be provided by the negative air pressure unit on an asbestos enclosure?	
As an analyst what action should be taken if an air test outside a stripping enclosure reaches an exposure level of 0.03 f/ml during work?	Stop the job [2], get people in the vicinity to leave the area [1], visually inspect the tent/enclosure and investigate source [1], inform the Client.
Asbestos may be resistant to many chemicals Is it soluble in water? Is it soluble in Alkali solution?	Insoluble in Water [2] Readily soluble in alkali [2]
What is mesothelioma?	Cancer/tumour [2] of the mesothelium, [2] the lining of the pleura or peritoneum [2] (linings of the main body cavities) <b>Maximum 4</b>
The effects of asbestos and tobacco smoke are said to be synergistic. What does this mean?	working together [2] to more greatly elevate the risk of disease [1] (lung cancer) than the two agents would pose individually [1] <b>Maximum 4</b>
Under the Control of Asbestos at Work Regulations 2006, whose responsibility is it to ensure that personal protective equipment is worn and used correctly?	Both Employer [2] and employee [2]
List the essential items that need to be recorded on an asbestos waste consignment notice	consignment note code[½], waste removal address [½], waste depositing address [½], premises code[½], name and address of waste producer [½], description of waste [½], quantity [½], SIC code[½], physical form[½], hazard code[½], container type[½] - number and size, EWC code[½], packing groups[½], UN ID numbers[½], proper shipping name[½], UN classes[½], special handling requirements[½], carrier name[½], carrier registration[½], vehicle registration used[½], consignors acceptance for the waste[½], receipt of waste (consignee) [½] details. <b>Maximum 4</b>
What is the maximum time for reporting of a dangerous occurrence in an asbestos stripping tent to the HSE under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995?	Immediately [4] or within 24 hours of incident [4] <b>Maximum 4</b>
Of the following buildings, where would you be <b>very unlikely</b> to find sprayed asbestos – factory/Industrial premises, school/college, house/domestic residence, swimming pool/leisure facilities? Why would this be the case?	House [2] Not of the construction style/method ( Steel /Concrete) that would require this treatment [2]
Give an example of a device that could be used as a primary standard for a working rotameter used to calibrate in the field	Soap Bubble meter [4] or Primary standard electronic flow calibrator [4] or electronic flow calibrator [2]
As an analyst do you use a Walton Beckett graticule for polarised light microscopy in the analysis of asbestos? Justify your answer	No [2] Walton Beckett graticule is used for fibre counting microscope set up.[2]
When carrying out a survey prior to demolition is an assessment of the condition of asbestos required? Justify your answer	No [2] As it is all to be removed anyway[2] so no ongoing risk
For a Type 2 Asbestos Survey according to MDHS 100 is it necessary to take a sample from every location where you suspect asbestos containing materials to be present? Justify your answer.	No it is not always necessary to sample all materials where it is obvious that they are similar and uniform products eg ceiling tiles floor tiles [2] Non uniform products like lagging may need more samples [2]

### **3. Short answer questions**

The lists below are examples of questions which course providers may wish to use during their courses as examples of the types of questions that the candidates will face in the actual examination. We have not provided example answers to these questions so that we may, if we wish, use these questions in actual examination papers.

### 3.1 Asbestos

- For compliance with the Control of Asbestos Regulations 2006 as part of the four stage clearance the air sampling method used must be as set out in: *[Complete the statement]*
- The most important task of an analyst when carrying out the 2<sup>nd</sup> stage of a 4-stage clearance is to: *[Complete the statement]*
- How long before carrying out the work must a company being employed to strip sprayed asbestos from a workplace inform the enforcing authority of the proposed activity?
- To comply with the Control of Asbestos Regulations 2006 how often should respirators used in asbestos stripping be **thoroughly** examined and tested?
- According to HSE Guidance Note HSG 248 before clearance air sampling takes place in an enclosure what should be done to the negative pressure unit?
- How frequently should a negative pressure unit be thoroughly examined and tested?
- As a building manager, the analyst covering a removal advises you that the method statement is significantly different from the work actually carried out. What action would you expect the analyst to take?
- In the Approved Code of Practice for the Control of Asbestos Regulations 2006 refresher training for those involved with asbestos work should be carried out at least every: *[Complete the statement]*
- When removing asbestos what personal protection would you expect to be wearing?
- The integrity of an enclosure in which asbestos stripping is to be carried out is most effectively checked by: *[Complete the statement]*
- At the start of an asbestos removal job as a Supervisory License Holder what would you want to be done first?
- What could provide a primary calibration for a working rotameter?
- When carrying out sampling to assess the adequacy of respiratory protection inside an asbestos stripping enclosure, according to HSG 248 where should the sampling head be located?
- Leakage into approved respirators is often most dependent on. *[Complete the statement]*
- During asbestos removal operations in a partially occupied office block, what type of monitoring would be conducted in adjacent offices?
- What negative pressure differential is recommended for the enclosure of a small calorifier when asbestos removal is to be carded out?
- For air samples designed to assess compliance with the 4 hour asbestos control limit, the flowrate should be: *[Complete the statement]*
- Apart from the pre-filter, why should the negative pressure unit should be located outside an asbestos stripping enclosure?
- You are employed to manage an asbestos removal contract in a boiler house. The enclosure has been built and you discover that there is a leaking valve occasionally dripping on lagged pipework in the area. What would you do about the leak?

- When conducting an asbestos clearance inspection in a boiler house, traces of asbestos debris are discovered around bolt heads on valve flanges. What would be the most appropriate action?
- Visual inspection of an enclosure revealed that asbestos removal work has been completed but with no dust or debris remaining. However, the clean end of the three stage airlock has some dust on the floor. What action should the analyst from the asbestos testing laboratory take?
- What standard would be applied to respiratory protection equipment used by an analyst entering an enclosure for monitoring as stage 3 of the four stage clearance procedure?
- As an analyst carrying out four stage clearance you find that the enclosure has been sprayed down with a PVA material. What would you do?
- According to MDHS 100 what factors need to be taken into consideration in calculating a material assessment?
- Whilst carrying out a survey you need to take samples from a tar and felt roof. What sampling frequency would you observe?
- Which type of asbestos survey must be completed before the demolition or dismantling of a building?
- What is the typical concentration of asbestos fibre found in textured coatings?
- Define/explain the purpose of a Type 2 Asbestos survey?
- Which is the preferred method for taking a sample from asbestos cement roofing sheet?
- In scoring a priority assessment algorithm, how should confined space be scored?
- Additional sampling during a Type 2 survey establishes that a wall board panel does **not** in fact contain asbestos. Give the most likely potential reason for the original error.
- What action should be undertaken where badly damaged asbestos insulating board (AIB) is present on the walls of a factory canteen?
- According to the MDHS 100, what would be the first step in planning a survey?
- Which is the preferred method of taking a bulk sample from an unsealed homogeneous sprayed coating?
- When should disposable coveralls be worn during asbestos surveys?
- When applying the material assessment algorithm in accordance with MDHS100, presumed or strongly presumed asbestos should be scored as if it was which type of asbestos? What is the score number in MDHS100 for this material?
- A piece of steam plant constructed between 2000 and 2001 contains material that is known to contain asbestos. What material is it likely to be?
- What is the purpose of the material assessment algorithm as defined by MDHS100?
- What, according to MDHS 100, must a surveyor have before commencing an asbestos survey?
- According to MDHS 100 when is information required for a risk assessment to be collected?

- What is mesothelioma?
- What is the initial starting point in a priority assessment algorithm for a survey of Asbestos containing materials in premises?
- What action should be taken where there is evidence in the form of particulate on the floor beneath sprayed asbestos on steel work at high level?
- What action should be carried out by a building manager where an electrician is required to access the void above a suspended ceiling of asbestos tiles in good condition for 15 minutes?
- What are the options that could be taken during a Type 2 asbestos survey, where an asbestos label is found attached to a piece of wooden plywood boarding in an office?
- Define/explain the purpose of a Type 1 Asbestos survey
- Which asbestos material could legitimately be found used in buildings constructed between 1996 and 1998?
- When carrying out a survey in accordance with MDHS100. If no access is available into a room or area what should the surveyor report?
- What asbestos fibre type would be determined, if it is observed as showing a feint yellow-brown pleochroism, straight extinction, 2<sup>nd</sup> order interference colours, length slow sign of elongation and dispersion staining colours in RI liquid of 1.67?
- What is the most likely treatment that Crocidolite has received if it is exhibiting positive (length slow) elongation?

### **3.2 Legionella**

- How do people catch Legionnaires' disease?
- Give two examples of how the disease may be medically confirmed.
- Why might Legionella tend to proliferate in the base of a hot water storage vessel?
- Why are mains fed electric showers generally considered to be a lower risk than mixer showers?
- It is recommended that multiple cold water tanks are connected in series. What are the possible consequences of operating multiple tanks that are connected in parallel?
- Which would be of more concern: water at 28°C in a clean tank, or water at 18°C in a rusty tank? Justify your answer
- Is legionnaires' disease notifiable in England and Wales? Is there any required reporting?
- How quickly must changes to the details required by the Notification of Cooling Towers and Evaporative Condensers Regulations be reported?
- What is the principal function of a granular filter such as a sand filter in a cooling tower or evaporative condenser system?

- Give two advantages of disinfecting a cooling tower system at a low chlorine concentration for a longer period, rather than at a high concentration for a shorter period.

### **3.3 Ergonomics**

- What is the definition of the term 'anthropometry' and what is its purpose?
- Name the main factors that contribute to the gender differences in strength?
- Describe the main methods by which work tasks can be redesigned to enhance a human's endurance in carrying out these tasks?
- Describe the criteria that can be used to ensure information presented to a person is compatible with their perceptual abilities.
- What is the purpose, advantages and disadvantages of the technique of timeline analysis?
- Give an example of an "engineering control" and how it can be used to reduce risk?
- Why should an analyst NOT assess manual handling risk by carrying out the manual handling work themselves?
- What ergonomic factors should be considered in defining the intended size of a workspace?
- What issues should be considered in the safe design of walkways and stairs?
- What design features of a workstation need to be considered in accommodating the user?

### **3.4 Control**

- Describe a technique to visualize dust or aerosol particulate material in the air?
- List the main elements of the hierarchy of control and the order of preference for the different measures.
- In a non-flanged captor hood, what is the approximate inward flow velocity reduction with distance?
- When a Centrifugal fan has its direction of rotation reversed, what happens to the air flow in the duct?
- What are the main reasons for installing an air cleaner in a local exhaust ventilation system?
- List four methods that can be used to evaluate the efficiency of local exhaust ventilation systems
- For what reasons should weather caps and cowls be avoided on external discharges?
- What equipment/instruments should be used to assess the performance and face velocity of a small ventilated booth?
- The potential for exposure to airborne contaminants for maintenance personnel is typically greater than for non-maintenance personnel because:

- What is the effect of fitting a flange to an extract duct?

### **3.5 Measurement of Hazardous Substances**

- What is the most suitable medium for sampling airborne oil mist?
- Employees who routinely work 10-hour shifts are exposed to a substance, which has a long-term exposure limit. What multiplier of measured exposures should be adopted for comparison with the 8-hour long-term exposure limit?
- From which welding process will the fumes produced contain the greatest percentage of hexavalent chromium? (Cr V1)
- A sampling pump was run at 2.2 litres per minute for 5 hours 45 minutes. The amount of respirable dust collected was 0.42 mg. What is the average airborne dust concentration over the sampling period
- Why does cadmium oxide fume have a very low short-term exposure limit?
- Following an air sampling survey for trichloroethylene (occupational exposure limit 100 ppm 8-hour time-weighted average) as part of a routine annual air monitoring programme, eight out of ten results are less than 50 ppm, one is 70 ppm and one is 115 ppm. What conclusions can be drawn and why?
- Calculate the 8-hour time-weighted average exposure to xylene vapour of a worker who spends 30 minutes each day at an operation where the concentration is 200 ppm, 5 hours at 50 ppm, and 5 hours at 10 ppm.
- Why are blank control samples and filters from air sampling dust placed in clean labelled tins or Petri dishes and left with the lids slightly ajar in the balance room overnight before being weighed?
- At a work activity where there are currently no control measures in use, an employee's exposure to an asthmagen with an occupational exposure limit of 5  $\mu\text{g}/\text{m}^3$  is measured at 4  $\mu\text{g}/\text{m}^3$ . Does anything need to be done and if so what?
- The exposure of a worker to respirable dust was measured during a series of operations. The results were:

Operation	Duration	Result
1	1 hr 15 mins	0.20 $\text{mg}/\text{m}^3$
2	3 hours	0.04 $\text{mg}/\text{m}^3$
3	2 hrs 45 mins	0.05 $\text{mg}/\text{m}^3$
4	30 mins	0.30 $\text{mg}/\text{m}^3$
5	30 mins	0.65 $\text{mg}/\text{m}^3$

What is the time-weighted average dust exposure during the course of the day?

- Workers are engaged in paint spraying using polyurethane paint containing Isocyanate (a respiratory sensitiser). A high degree of control, including respiratory protection is in place. What additional testing should be carried out to provide evidence of the continuing effectiveness of control measures?

- What air sampling strategy should be adopted for the evaluation of exposure to Cadmium Oxide fume (WEL  $0.05 \text{ mg/m}^3$  8-hr TWA,  $0.05 \text{ mg/m}^3$  15-min STEL)
- What is the main purpose of fixed location static samplers?
- When sampling for airborne asbestos fibres, what filter should be used for the standard method of microscopic evaluation
- Automatic continuous monitoring of sulphur dioxide gas is best carried out using which technique?
- List two methods for detection used in Gas liquid chromatography
- Which external quality control scheme is concerned with asbestos fibre counting?
- For a substance hazardous to health with a 'Sk' notation in HSE Guidance Note EH40 'Workplace Exposure Limits', what would be the route of entry into the body?
- What biological index is used normally used for the biological monitoring of exposure to inorganic mercury
- Several dust filters are weighed before and after air sampling. Along with these filters, three 'blank' filters are also weighed. The measured weights of the filters are:

Filter	Weight before (mg)	Weight after (mg)
Sample filter 1	26.137	27.087
Blank filter 1	25.136	25.143
Blank filter 2	26.584	26.595
Blank filter 3	26.254	26.257

The weight of dust on sample filter 1, corrected for the average weight change of the blanks, is?

### **3.6 Noise**

- Five sound sources generate the following noise levels in dB(A) at a listener's ear: 92, 88, 86, 93, 81 dB(A). What is the total noise level (to the nearest dB(A)) when they all occur at the same time?
- If a frequency analyzer used for measuring vibration has been set up so that  $1 \text{ g}$  ( $9.81 \text{ m/s}^2$ ) is equivalent to 0dB, what does a value of 20dB higher relate to?
- A person is exposed to 75 dB(A) for 3 hours, 84 dB(A) for 2 hours, 90 dB(A) for 1 hour and 93 dB(A) for 2 hours. This is equivalent (approximately) to an exposure for 8 hours of:
- A centrifugal fan has 40 blades, and rotates at 1500 rpm. Which predominant frequency would be expected to be found in the noise produced?
- What is the most accurate and easy way to assess a complicated noise exposure that consists of a series of different noise sources experienced over a period of time?
- When constructing a noise enclosure for a plastics grinding machine what are the preferred materials for the enclosure panels?
- In the course of an environmental noise investigation in accordance with BS4142 a dominant

noise source operates for 15 minutes per hour during the daytime only. If the  $L_{AeqTm} = 56$  dB(A), what is the daytime specific noise level?

- What is the physical principle on which the accelerometer depends for the measurement of vibration?
- In what units should the magnitude of vibration for assessment of hand held tool be expressed as?
- What is the main benefit of wearing anti-vibration gloves?

### **3.7 Thermal Environment**

- In a room admitting sunlight through a window, what is the air temperature determined by?
- The uptake of oxygen at 1 litre per minute is equivalent to approximately what level of metabolic rate (in watts)?
- When assessing heat stress using the Wet Bulb Globe Temperature Index, apart from natural wet bulb, globe and dry bulb temperatures, what other parameters are considered when assessing work/rest regimes?
- What two relationships are described on a psychrometric chart?
- For the ultra-violet range 200 to 315 nm, at what wavelength is the lowest maximum permissible exposure for an 8 hour period?
- For the ultra-violet range 200 to 315 nm, at what wavelength is the lowest maximum permissible exposure for an 8 hour period?
- What is visual acuity?
- The illuminance on a plane due to a lamp placed 0.75 metres away is 40 lux. What is the illuminance (in lux) on the plane if it is placed 1.5 metres away?
- What is a hazard due to absorption of Infra-red radiation:
- What is the short term health effect of exposure to extremely low frequency electromagnetic radiation?

### **Changes to Examinations 2009**

On 1 November 2009 all examinations will be changed from Multiple choice questions [MCQ] to short answer [SAQ] questions. The essays from the Occupational Hygiene Modules will also be changed to micro-essays [MEQ]. The format of each exam is listed below.

<b>Module</b>	<b>SAQ</b>	<b>Micro-essay</b>	<b>Duration</b>
M101	40	5 from 8	2 hours 15 mins
M102	40	5 from 8	2 hours 15 mins
M103	40	5 from 8	2 hours 15 mins
M104	40	5 from 8	2 hours 15 mins
M201	40	5 from 8	2 hours 15 mins
M202	40	5 from 8	2 hours 15 mins
M203	40	5 from 8	2 hours 15 mins
M204	40	5 from 8	2 hours 15 mins
M205	40	5 from 8	2 hours 15 mins
M302	40	5 from 8	2 hours 15 mins
M304	40	5 from 8	2 hours 15 mins
S301	40	5 from 8	2 hours 15 mins
P401	20		45 mins
P402	40		1 hour 30 mins
P403	20		45 mins
P404	40		1 hour 30 mins
P405	40		1 hour 30 mins
P406	40		1 hour 30 mins
P601	35		1 hour 15 mins
P602	35		1 hour 15 mins
P701	35		1 hour 15 mins
P801	35		1 hour 15 mins
P901	20		45 mins
P902	20		45 mins
P402 R	25		45 mins
P406R	25		45 mins
P405 R	25		45 mins proposed