



Unit B: Hazardous agents in the workplace

WEDNESDAY 3 JULY 2013
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 An employer is concerned that the building where a number of employees work may have high levels of the ionising radiation radon.
- (a) **Identify** the possible effects that this may have on the employees' health. (2)
- (b) **Identify** the route by which employees can be exposed to radon. (4)
- The employer has undertaken some measurements to determine the level of radon in the building. The results of the measurements show that the levels of radon in ground floor and basement store rooms are in excess of 400 Bq/m³.
- (c) **Outline** the steps that the employer must take in order to reduce the employees' exposure to radon. (4)
- 2 Work-related upper limb disorders (WRULDs) can develop if ergonomic principles are not followed when designing work tools and work equipment.
- (a) **Outline** what is meant by the term '*ergonomic principles*'. (2)
- (b) **Outline** how the *design* of work tools and work equipment can help to minimise the risk of a person developing a WRULD. (8)

- 3 (a) **Outline** the principles of a prospective cohort study as used in epidemiology. (4)
- (b) **Outline** factors that may affect the reliability of prospective cohort studies. (6)
- 4 The use of hand-held vibrating tools can cause hand-arm vibration syndrome (HAVS).
- (a) **Outline** the health effects of HAVS. (3)
- (b) **Outline** factors to consider when assessing the risk to employees who make extensive use of hand-held vibrating tools. (7)
- 5 The following is referred to as a heat balance equation:
- $$M = K + C + R + E$$
- (a) **Identify EACH** of the terms in this equation **AND outline** how the equation can be used to evaluate the thermal comfort of an individual. (7)
- (b) **Outline** the natural mechanisms that occur in the human body if, due to excessive physical work activity, M is greater than $K + C + R + E$. (3)
- 6 A national chain of high street off-licence stores is experiencing a significant number of incidents of violence and aggression towards its employees from customers visiting its stores.
- (a) **Identify** the factors that could be contributing to these incidents of violence and aggression towards the employees. (4)
- (b) The chain has recently re-trained all employees in personal safety and in dealing with violent and aggressive situations.
- Other than training, outline* a range of practical control measures that could be put in place in order to reduce the risk of violence and aggression from customers. (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** A small printing organisation operates a number of printing machines that are located in an open-plan workshop. Following a noise survey the organisation discovers that its employees are being exposed to noise levels of 86 dB(A) $L_{EP,d}$.
- (a) **Outline** the significance of this noise level to an employer. (5)
- (b) **Describe** a range of technical **AND** organisational control measures that could be introduced. (15)

- 8** (a) **Explain** the circumstances when it may be necessary to use respiratory protective equipment (RPE) as a control measure to reduce exposure to a hazardous substance. (6)

Employees carrying out a short duration task involving a corrosive vapour of ammonia have been provided with RPE to protect them from inhalation of the corrosive vapour. The employer used the following information to determine the selection of the RPE.

Concentration of ammonia vapour in the workplace	280ppm
Workplace exposure limit for ammonia is	35ppm (15 min STEL)
Assigned protection value for selected RPE	APF= 20

- (b) **Explain** how the employer can use this information to determine if the choice of RPE is appropriate. (4)
- (c) **Outline** *other* factors that the employer should consider when selecting RPE for use in this particular task. (10)

- 9 Methanol, an organic solvent, is being used in the production of a specialist coating. An operative's measurement of exposure to the methanol varies throughout his/her 8-hour working day. The results of measurements of the operative's exposure are as follows:

Table 1

Task undertaken by operative	Duration of task	Exposure to methanol (ppm)
Measuring out and adding methanol	15 minutes	280
Adding other components to the mix	2 hour	90
Supervision of mixing and decanting	2 hours	150
Clean down of equipment using solvents	3 hours	150

Assume that exposure is zero at all other times.

- (a) **Calculate** the 8-hour time-weighted average (TWA) exposure to methanol for the operative.
Your answer should include detailed working to show that you understand how the exposure is determined.

(8)

- (b) Information relating to methanol in EH40 Workplace exposure limits is as follows:

Table 2

Substance	CAS number	Workplace Exposure Limit				Comments
		Long-term exposure limit (8-hour TWA limit reference period)		Short-term exposure limit (15-minute reference period)		
		ppm	mg/m ³	ppm	mg/m ³	
methanol	67-56-1	200	266	250	333	Sk

Using your results from part (a), the original exposure information in Table 1 **AND** by selecting the *relevant* data from Table 2, **explain** what actions might be required by the employer in order to comply with the Control of Substances Hazardous to Health (COSHH) Regulations 2002.

(8)

- (c) **Outline** how the personal exposure of the operative to methanol can be measured.

(4)

- 10 (a) **Give** the meaning of the term 'occupational health'.

(4)

- (b) **Outline** the circumstances when health surveillance would be considered appropriate according to Regulation 11 of the Control of Substances Hazardous to Health (COSHH) Regulations 2002.

(4)

- (c) **Outline** the arrangements that an organisation should put in place if they are to carry out health surveillance in accordance with the COSHH Regulations.

(12)

- 11 The following is an extract from the Approved List of Biological Agents:

Biological Agent	Classification	Notes
Hepatitis B	3	V

- (a) **Explain** the purpose and content of information included in the Approved List of Biological Agents. (6)
- (b) A healthcare research laboratory undertakes work with human blood and tissue samples that contain the biological agent listed above.
- Outline** a range of *technical* controls that should be used in order to minimise the risks to those working with this biological agent in the laboratory. The research work means that elimination or substitution of the biological agent is not possible. (12)
- (c) Whilst carrying out work with this biological agent a laboratory worker is exposed to the biological agent.
- Outline** the circumstances in which this exposure may result in a report to the enforcing authorities under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR). (2)