

Unit C: Workplace and work equipment

THURSDAY 20 JANUARY 2011
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 Exothermic chemical processes rely on efficient control of temperature and pressure to prevent the phenomenon of ~~runaway reaction~~(*thermal runaway*) when mixing chemicals in a reactor.
- Outline** the methods used to control temperature and pressure in such circumstances. (10)
- 2 (a) In relation to automatic fire detection and alarm systems, **outline** the basic principles of operation of:
- (i) heat detectors; (4)
- (ii) smoke detectors. (4)
- (b) **Identify** the circumstances in which **EACH** type of detector would be *inappropriate*. (2)
- 3 (a) **Outline** the principles of gamma radiography. (3)
- (b) **Outline** the advantages and disadvantages of gamma radiography as a form of non-destructive testing. (7)

- 4 The Lifting Operations and Lifting Equipment Regulations 1998 specify fixed intervals between thorough examinations of lifting equipment but also includes an option for thorough examination to be carried out in accordance with an examination scheme.
- Outline** the factors that a competent person would need to take into account when deciding whether **less** frequent examinations might be justified. (10)
- 5 The residents of a village have recently been affected by a fallout of dust on their cars and property. They allege that the dust comes from a cement works situated a few miles away.
- Outline** the steps that should be taken by those responsible for the cement works in order to investigate whether emissions from the works are the cause of the problem. (10)
- 6 In relation to a newly designed machine that falls within Schedule 2 Part 4 Annex (iv) of the Supply of Machinery (Safety) Regulations 2008, **outline** the procedures that must be followed, and the requirements that must be met, before such a machine is placed on the market for sale in the European Economic Area. (10)

SECTION B

This section contains five questions. Answer **THREE** questions only.

All questions carry equal marks.

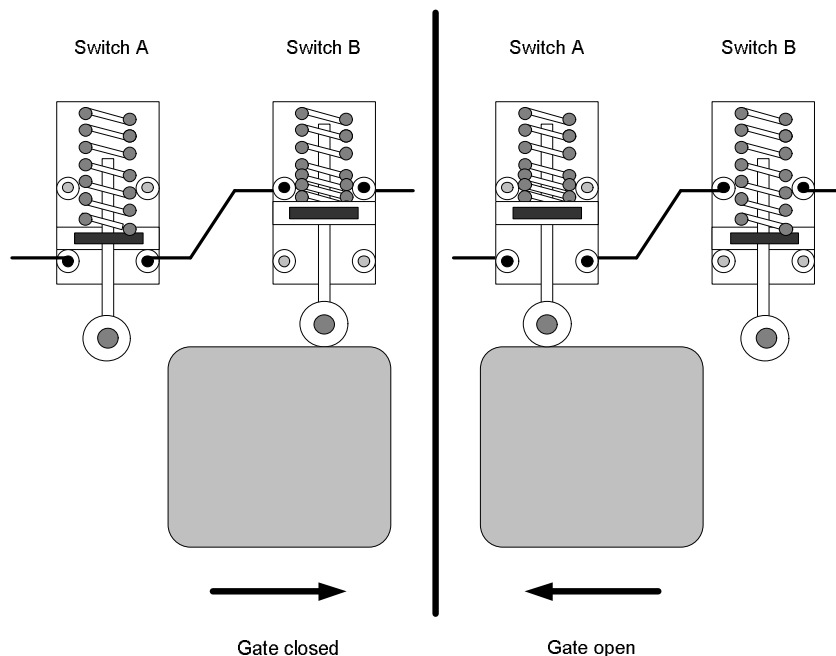
The maximum marks for each question, or part of a question, are shown in brackets.

You are advised to spend about **30 minutes** on each question.

Start each answer on a new page.

- 7 A company has been contracted to undertake maintenance work on the roof of a building that is partly constructed of fragile material.
- (a) **Identify** the characteristics of the fragile material that may contribute to the risk of falls through the roof. (6)
- (b) **Outline** the measures to be taken to minimise the risk to persons involved with the work. (14)

- 8 Contractors are required to work in a sewer chamber that is accessed via a vertical shaft. Due to their enclosed nature, the shaft and chamber may have to be categorised as confined under the Confined Spaces Regulations 1997.
- (a) **Outline** the hazards the contractors could be exposed to when undertaking this activity. (7)
 - (b) **Outline** the risks that would be classed as ~~as~~ specified risks under the Confined Spaces Regulations 1997. (6)
 - (c) **Outline** the issues to consider when developing emergency arrangements that will be provided during this activity. (7)
- 9 An external lift on a construction site has an interlocked guard to prevent the lift operating when the gate is open. With reference to the diagram:
- (a) **identify** the **TWO** types of switch shown (Switch A **AND** Switch B); (2)
 - (b) **identify** the functional components associated with **BOTH** switches; (4)
 - (c) **outline** the normal sequence of operation for the electrically-operated, cam-activated switch assembly when the gate opens and closes; (6)
 - (d) **outline** ways in which electrically-operated, cam-activated switches may fail to operate as intended. (8)



- 10** In relation to dust explosions:
- (a) **explain** the conditions that must be present for a primary dust explosion to occur; (4)
 - (b) **explain** the additional conditions necessary for secondary explosions to occur; (4)
 - (c) **identify** the causes and effects of the General Foods dust explosion, Banbury 1981; (4)
 - (d) **identify** the design features that would minimise the likelihood and effect of a dust explosion. (8)
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- 11** A corrosive substance has a flash point of 20°C. An electrical sub-contractor has been employed to design and install the electric supply to an open air production plant which is used to manufacture the corrosive substance. This plant is located next to the sea.
- (a) **Outline** the aspects of this situation which the designer of the electrical supply must address to ensure that the installed system will be compliant with the Electricity at Work Regulations 1989. (10)
 - (b) **Describe** the types of fault that may be found in fixed electrical systems under such conditions. (10)