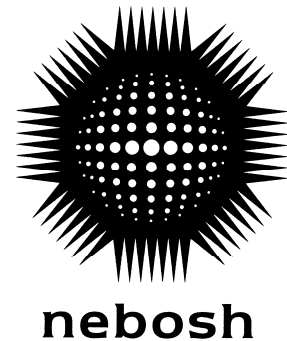


THE NATIONAL EXAMINATION BOARD IN
OCCUPATIONAL SAFETY AND HEALTH

NEBOSH NATIONAL DIPLOMA IN
OCCUPATIONAL HEALTH AND SAFETY



Unit A: Managing health and safety

TUESDAY 18 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** A large public limited company (plc) has recently experienced a fire and explosion resulting in multiple fatalities and extensive environmental damage.
- (a) **Outline** a range of consequences that may affect the company as a result of this incident. (5)
- (b) As a result of the incident, shareholders in the company have raised concerns about the risk management arrangements that are in place and have called into question the Board's annual statement that was provided as part of compliance with the Turnbull/Financial Reporting Council guidelines on internal control.
- Explain** the purpose of these guidelines and why they are relevant to this type of incident. (5)
- 2** **Explain** the domino and multi-causality theories of accident causation, including their respective uses and possible limitations in accident investigation and prevention. (10)

- 3 A twin-engine aircraft crashed following the partial failure of one of its engines. Although the aircraft could have landed safely on the one good engine the pilot mistakenly shut down the good engine instead of the failed engine. The aircraft was equipped with a new electronic instrument display in which the traditional analogue gauges with mechanical pointers had been replaced by less clear electronic readouts. Vibration levels for each engine were displayed on two separate gauges in the instrument cluster and investigation suggested that the pilot may have confused which of the gauges related to which engine.
- Outline** design features of the aircraft display system which could help to avoid similar or other errors in reading the instrumentation. (10)
- 4 (a) **Give** the meaning of the term '*safety culture*'. (2)
- (b) **Outline** a range of organisational issues that may act as barriers to the improvement of the safety culture of an organisation. (8)
- 5 (a) **Describe** the statutory procedures for making regulations under the Health and Safety at Work etc Act 1974. (6)
- (b) **Outline** the purpose and principles of cost-benefit analysis as it applies to proposed regulations. (4)
- 6 Your company employs 900 people at a warehousing and distribution site. Your site manager has asked for a set of summary information to be provided each month for its executive meetings in order to monitor the overall health and safety performance of the site.
- Outline** the possible contents of that set of information. (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 chemical reaction vessel is partially filled with a mixture of highly flammable liquids. It is possible that the vessel headspace may contain a concentration of vapour which, in the presence of sufficient oxygen, is capable of being ignited. A powder is then automatically fed into this vessel.

Adding the powder may sometimes cause an electrostatic spark to occur with enough energy to ignite any flammable vapour. There is therefore concern that there may be an ignition during addition of the powder.

To reduce the risk of ignition, an inert gas blanket system is used within the vessel headspace designed to keep oxygen below levels required to support combustion. In addition, a sensor system is used to monitor vessel oxygen levels. Either system may fail. If the inert gas blanketing system and the oxygen sensor fail simultaneously, oxygen levels can be high enough to support combustion.

Probability and frequency data for this system are given below.

Failure type/event	Probability
Vessel headspace contains concentration of vapour capable of being ignited	0.5
Addition of powder produces spark with enough energy to ignite vapour	0.8
Inert gas blanketing system fails	0.2 per year
Oxygen system sensor fails	0.1

- (a) **Draw** a simple fault tree **AND** using the above data **calculate** the frequency of an ignition. (16)
- (b) **Outline TWO** plant or process modifications that you would recommend to reduce the risk of an ignition in the vessel headspace. (4)
- 8 A small company formulating a range of chemical products operates from a site on which it employs about 50 staff. Although not falling within the scope of the Control of Major Accident Hazards Regulations 1999, the site poses a risk to employees, the neighbouring community and the environment.
- (a) **Outline** the types of emergency procedure that a site of this nature may need to put in place in order to deal with incidents affecting the safety of site personnel. (5)
- (b) **Identify** the factors that should be considered during the development of a major incident procedure **AND outline** the arrangements that should be in place to ensure that such a procedure is effective. (15)

- 9 A manager in a manufacturing business calls out an engineer from their equipment supplier to repair and reset a piece of production equipment. After the repair there are difficulties in resetting the equipment. To help resolve this, the manager removes a fixed guard from the equipment to allow easier visibility and quicker adjustment. The engineer employed by the equipment supplier is subsequently injured on a piece of moving machinery that should have been protected by the guard.
- (a) **Outline** possible breaches of the Health and Safety at Work etc Act 1974. *Your answer should include the company or individuals who may have committed the breaches, the specific legal requirements (including Section numbers) that have been breached AND, in EACH case, reasons for the possible breach.* (16)
- (b) The manufacturing business is subsequently prosecuted under Section 3 of the Health and Safety at Work etc Act and it attempts to defend itself by blaming the acts of the manager about which it knew nothing.
- Explain**, with legal reasons, whether this defence could be successful. Make reference to case law where appropriate. (4)
- 10 An employee suffered a fractured skull when he fell three metres from storage racking as he was loading cartons onto a pallet held on the forks of a lift truck. A subsequent investigation found that the managers of the company were aware that it was common practice for employees to be lifted up on the forks of the vehicle and for them to climb up the outside of the racking.
- (a) **Outline** the legal actions that might be available to the injured person in a claim for compensation **AND** the tests that would have to be made for the actions to succeed. (14)
- (b) **Explain** the meaning of ~~general~~ and ~~special~~ damages that may be awarded in the event of a successful claim **AND give** examples of the factors that are considered in calculating their value. (6)
- 11 (a) **Outline** the meaning of 'skill-based', 'rule-based' **AND** 'knowledge-based' behaviour. (6)
- (b) With reference to practical examples or actual incidents, **explain** how **EACH** of these types of operating behaviour can give rise to human error **AND, in EACH case, explain** how human error can be prevented. (14)