THE NATIONAL EXAMINATION BOARD IN OCCUPATIONAL SAFETY AND HEALTH

NEBOSH NATIONAL DIPLOMA IN OCCUPATIONAL HEALTH AND SAFETY

Unit C: Workplace and work equipment

THURSDAY 17 JANUARY 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.

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1 Ten artists work alone at their individual home premises making ceramic tiles. They use gas-fuelled firing kilns and 2m high, electric-powered clay mixers, which are located in outbuildings.

Outline risks associated with this work **AND outline** appropriate controls to reduce these risks. **(10)**

2 **Outline** specific causes of:

(a) lateral instability; **(5)**

(b) longitudinal instability **(5)**

in counterbalanced forklift trucks.

3 A rectangular, steel-framed warehouse, measuring 40m x 100m and 18m high, was severely damaged in a storm. One of the long coated steel walls suffered catastrophic failure, which in turn caused the flat roof of the warehouse to collapse and the other coated steel walls to buckle.

Outline the health and safety issues to be considered when planning the subsequent demolition of the damaged warehouse. **(10)**

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4 Sparking, caused by electrostatic discharge, is a significant ignition source of flammable atmospheres.

(a) **Outline** the mechanism by which electrostatic discharge of static electricity occurs. **(6)**

(b) **Outline** a range of control measures to reduce the risk of electrostatic discharge ignition of flammable atmospheres. **(4)**

5 A system to undertake the periodic examination and testing of portable electrical appliances is to be introduced.

(a) **Outline** factors that would determine the frequency that the examination and testing should be introduced. **(5)**

(b) **Outline** factors, other than the frequency of examination and testing, that should be considered when introducing such a system. **(5)**

6 On 20 December 1984, at Summit Tunnel on the Yorkshire / Lancashire border near Todmorden, a train carrying about 835 tonnes of petrol in 13 rail tanks was derailed due to a defective axle bearing on the fourth tank. Only the locomotive and the first 3 tanks remained on the rails. Petrol leaking from a tanker ignited and set off a series of events that led to an intense fire in the tunnel, which reached temperatures in excess of 1500°C.

(a) **Outline** the effects of the fire on the brick lining of the tunnel with respect to the performance of the material **AND** the structural integrity of the tunnel lining. **(6)**

(b) **Outline** the means by which the effects of such fires on brick structures might be mitigated. **(4)**

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 non-computerised production line where tubes of toothpaste are filled, capped and packed manually by employees is to be relocated. The relocation will require dismantling the production line and installing it at the new location.

Explain the possible risks associated with the use of the production line arising out of its relocation. **(20)**

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8 An exothermic chemical reaction is controlled from a panel that requires an operator to monitor a digital temperature display and press an emergency dump valve actuator to quench the reaction if a critical temperature is reached. The Health and Safety Executive has raised concern about the adequacy of relying on the operator to take the necessary action at the critical temperature. It is proposed to automate the quench activation by using a temperature detector (A) to trigger a programmable switch (B) that will operate a motorised valve (C). These components are connected in series as shown below in Fig.(i).

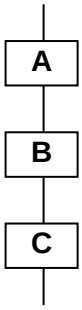

Fig. (i)

A HAZOP study recommends that the reliability of the activation system can be enhanced by parallel doubling of the redundancy of the detector and switch elements to activate the motorised valve. The enhanced arrangement is shown in Fig. (ii)

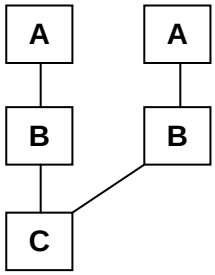

Fig. (ii)

Reliability data for the components is given below:

Component	Reliability
A	0.92
B	0.86
C	0.96

(a) Using simple reliability theory, **calculate** the reliability of the system shown in Fig. (i). **(2)**

(b) **Calculate** the improvement in reliability that would arise from using the parallel detection / switching arrangement shown in Fig. (ii) when compared with the simpler system shown in Fig. (i). **(6)**

(c) Component reliability is not the only factor affecting reliable temperature detection. **Outline** factors to be considered when providing temperature detection for an exothermic reaction. **(4)**

(d) **Identify** factors that should be taken into account when deciding whether to adopt either of the two automated systems described. **(4)**

(e) **Outline** other reaction control measures that might be used as alternatives to the temperature-activated dump valve. **(4)**

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9 Six false fire alarms were generated over a three month period at a warehouse used for the storage of stationery products. During this period the warehouse premises were being expanded. On each occasion, the local Fire and Rescue Authority attended the premises. After the last occasion, the Fire and Rescue Authority inspected the warehouse and discovered that the employees had failed to evacuate on all but the first occasion. They also discovered that neither testing nor maintenance had been carried out on the fire alarm system for five years.

(a) **Outline** the enforcement action options the Fire and Rescue Authority may take as a result of their inspection findings. **(10)**

(b) **Identify** the possible causes of the false alarms. **(6)**

(c) **Identify** the actions the warehouse company should take to help ensure their employees respond appropriately to fire alarms. **(4)**

10 A pressurised steam boiler requires an examination. At the same time a repair on an electrically driven pump, associated with the boiler, is needed.

(a) **Outline** the meaning of the term *'relevant fluid'* as referred to in the Pressure Systems Safety Regulations 2000. **(4)**

(b) **Outline** the typical contents of a written scheme of examination form for the statutory inspection of the boiler. **(8)**

(c) **Identify** the practical measures that should be taken in order to carry out the pump repair safely. **(8)**

11 **Outline** the layout and structural design features that should be considered in order to minimise the risks associated with internal transport activities in the premises of a major logistics warehouse company. **(20)**

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