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SUBJECT: **Engineering Technology**  
PAPER NUMBER: Controlled – Unit 3  
DATE: 24<sup>th</sup> April 2024  
TIME: 10:00 a.m. to 11:35 a.m.

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**THIS PAPER SHOULD BE RETURNED TO THE INVIGILATOR  
AFTER THE EXAMINATION.**

**Name of candidate** \_\_\_\_\_

**I.D. number** \_\_\_\_\_

**School** \_\_\_\_\_

**Class** \_\_\_\_\_

Answer **ALL** questions in the space provided.

**Scenario**

- A town is powered by a nuclear power station.
- An electrical engineer was tasked to propose other different electrical power generation options.

**Question 1**

**K-1 (4 marks)**

a. Name **FOUR** different types of electrical power generation plants, besides a nuclear power station that can be considered.

Type 1: \_\_\_\_\_ (0.25)

Type 2: \_\_\_\_\_ (0.25)

Type 3: \_\_\_\_\_ (0.25)

Type 4: \_\_\_\_\_ (0.25)

b. Define the terms 'electrical power generation' and 'electrical power distribution'.

Electrical power generation: \_\_\_\_\_

\_\_\_\_\_

(0.5)

Electrical power distribution: \_\_\_\_\_

\_\_\_\_\_

(0.5)

c. Describe in **FIVE** main stages how electrical power reaches consumers from an electrical generation plant.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

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(2)

**Question 2****K-2 (4 marks)**

a. List **ONE** application for each of the electromagnetic devices listed in Table 1.

Table 1: Electromagnetic devices

	<b>Electromagnetic Devices</b>	<b>Application</b>
i.	 <p>Loudspeakers (Source: <a href="https://www.bhphotovideo.com">https://www.bhphotovideo.com</a>)</p>	<hr/> <hr/> <hr/> <p style="text-align: right;">(0.25)</p>
ii.	 <p>Transformers (Source: <a href="https://www.cdivine.com.ng">https://www.cdivine.com.ng</a>)</p>	<hr/> <hr/> <hr/> <p style="text-align: right;">(0.25)</p>

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	Electromagnetic Devices	Application
iii.	 <p><b>Solenoid</b> (Source: <a href="https://www.amazon.in">https://www.amazon.in</a>)</p>	<hr/> <hr/> <hr/>
iv.	 <p><b>Generators and Motors</b> (Source: <a href="https://www.hvhindustrial.com">https://www.hvhindustrial.com</a>)</p>	<hr/> <hr/> <hr/>

b. Outline the working principle of an electromagnet.

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(1)

c. Using the terms labelled in Figure 1, describe how a relay achieves its function.

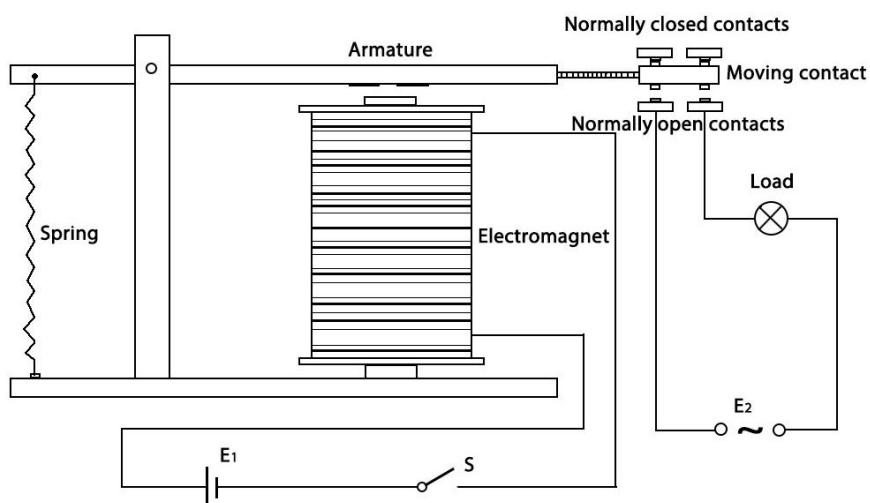


Figure 1: Relay  
(Source: <https://osoyoo.com>)

### Question 3

**C-1 (6 marks)**

a. Outline **TWO** reasons why it is important to select a fuse with the appropriate current rating.

Reason 1: \_\_\_\_\_  
\_\_\_\_\_

Reason 2: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

b. Calculate, by showing all your workings, the appropriate fuse rating required to protect a hair dryer with the following specifications:

2200 W; 230 V

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(2)

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c. Discuss the main differences between an MCB and a fuse, apart from cost and sensitivity to current overload.

## Question 4

**K-6 (4 marks)**

a. List **FOUR** different types of bearings, apart from fluid bearing.

Type 1: \_\_\_\_\_ (0.25)

Type 2: \_\_\_\_\_ (0.25)

Type 3: \_\_\_\_\_ (0.25)

Type 4: \_\_\_\_\_ (0.25)

b. A bearing can fail prematurely when inadequately lubricated.

Identify another **TWO** factors from the below list that may cause a bearing to fail prematurely.

incorrect fit	different inner and outer race radii shaft and bearing are perpendicular	ineffective bearing sealing
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Failing Factor 1: \_\_\_\_\_ (0.5)

Failing Factor 2: \_\_\_\_\_ (0.5)

c. Bearings can be replaced using wax to force out a thrust bearing. Outline **TWO** other methods that can be used to replace a bearing.

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(2)

### Question 5

**K-9 (4 marks)**

a. List the **FIVE** main classes of fire against their type in Table 2.

Table 2

Class of Fire	Type of Fire	
	Fires with flammable or combustible liquids as the fuel source	(0.2)
	Fires involving cooking oils	(0.2)
	Fires involving electrical equipment	(0.2)
	Fires with trash, wood, paper, or other combustible materials as the fuel source	(0.2)
	Fires involving gases	(0.2)

***This question continues on next page.***

b. Identify **ONE** fire extinguisher from the list given below that should be used in each of the circumstances given in Table 3. One type of extinguisher may be used in different circumstances.

Water      Wet Chemical      Dry Powder      CO<sub>2</sub>      Foam

Table 3: Fire extinguisher for different classes of fire

	<b>Fire</b>	<b>Fire Extinguisher</b>
i.	Fire involving paper	
ii.	Fire involving liquefied petroleum gas	
iii.	Fire involving paint	
iv.	Fire involving cooking oil	

(1)

c. Describe **FOUR** important practices to adopt when a fire emergency occurs.

(2)