



L-Università
ta' Malta

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE
EXAMINATIONS BOARD

**SECONDARY EDUCATION CERTIFICATE LEVEL
2024 SUPPLEMENTARY SESSION**

SUBJECT: **Engineering Technology**
PAPER NUMBER: Synoptic – Unit 3
DATE: 1st November 2024
TIME: 8:30 a.m. to 10:35 a.m.

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

For examiners' use only:

Question	1	2	3	4	5	6	7	8	Total
Score									
Maximum	6	8	8	8	8	8	12	12	70

Answer **ALL** questions in the space provided. The use of non-programmable electronic calculators is allowed.

Scenario

- A technician applied for an internal position with an engineering company.
- He is required to answer the following questions to assess his knowledge on the safe construction operation and maintainability of different electro-mechanical systems, using different power tools.

Question 1

K-1 (6 marks)

a. Name **FOUR** different types of electrical power generation plants.

Type 1: _____ (0.5)

Type 2: _____ (0.5)

Type 3: _____ (0.5)

Type 4: _____ (0.5)

b. Define the following terms in relation to electrical power:

Generation of electrical power.

_____ (1)

Distribution of electrical power.

_____ (1)

c. Electrical power reaches the consumer from the generation plant through different stages. Firstly, at the power plant, a primary source of energy is converted into electrical energy. Describe the remaining **FOUR** stages required for power to reach the consumer.

6



(2)

Question 2



K-2 (8 marks)

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

Table 1: Electromagnetic devices

	Electromagnetic Devices	Application
i.	 Relays (Source: https://www.morssmitt.com)	_____ _____ _____ (0.5)
ii.	 Microphones (Source: https://www.soundguys.com)	_____ _____ _____ (0.5)

This question continues on next page.

	Electromagnetic Devices	Application
iii.	 <p>Transformers</p> <p><i>(Source: https://www.irrcircuitbreakerwholesale.com)</i></p>	<hr/> <hr/> <hr/> <p>(0.5)</p>
iv.	 <p>Solenoid</p> <p><i>(Source: https://www.amazon.in)</i></p>	<hr/> <hr/> <hr/> <p>(0.5)</p>

b. Outline the working principle of an electromagnet.

(2)

c. Describe how a relay achieves its function by referring to the labels of the **FOUR** different parts of the relay shown in Figure 1.

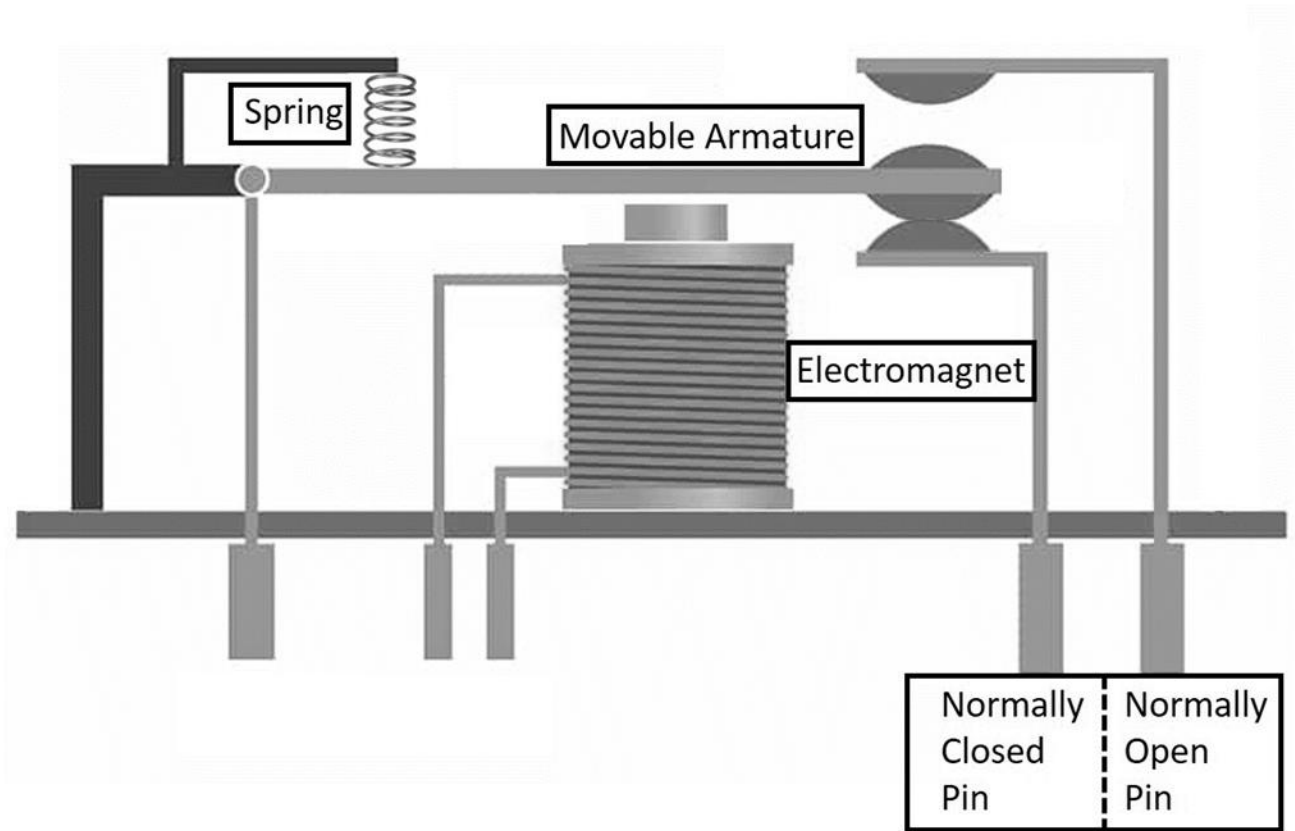


Figure 1: Relay
(Source: <https://www.codrey.com>)

(4)

8

Please turn the page.

Question 3

K-5 (8 marks)

a. List **TWO** different types of motors, besides stepper and servo motors.

Type 1: _____ (1)

Type 2: _____ (1)

b. Match stepper and servo motors with their typical application in Table 2 below.

Table 2: Motor Applications.

Typical Application	Type of Motor
Remote control car	_____ (1)
3D printers	_____ (1)

c. Describe the working principles of the stepper and servo motors.

Stepper Motor: _____

_____ (2)

Servo Motor: _____

_____ (2)

8

Question 4

K-6 (8 marks)

a. List **FOUR** different types of bearings.

Type of bearing 1: _____ (0.5)

Type of bearing 2: _____ (0.5)

Type of bearing 3: _____ (0.5)

Type of bearing 4: _____ (0.5)

b. Bearings can fail prematurely as a result of different factors one of which is ineffective bearing sealing.

Identify **TWO** different factors that may cause a bearing to fail prematurely from the ones provided below.

shaft misalignment	lighter loads than designed for incorrect fit	low rotational speed
--------------------	--	----------------------

Failing Factor 1: _____ (1)

Failing Factor 2: _____ (1)

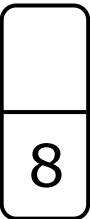
c. Outline **TWO** methods how different bearings can be replaced.

Method 1: _____

_____ (2)

Method 2: _____

_____ (2)



Please turn the page.

Question 7

C-1 (12 marks)

a. Outline the importance of selecting a fuse with the appropriate current rating in terms of:

Function.

(2)

Hazards that might arise when selecting inappropriate fuse.

(2)

b. Calculate the appropriate fuse rating for a microwave operating at 230V that has a maximum power consumption of 1,000 W. Show all your workings.

(4)

c. Discuss the main differences between an MCB and a fuse in terms of the following characteristics.

Cost: _____

(2)

Sacrificial vs. reset: _____

_____ (2)

12

Question 8

C-4 (12 marks)

a. State **FIVE** different pieces of information needed when reporting an emergency situation:

i. _____ (0.8)

ii. _____ (0.8)

iii. _____ (0.8)

iv. _____ (0.8)

v. _____ (0.8)

b. Describe the necessary procedure to perform when the following **TWO** incidents occur in a workshop.

Electric Shock:

_____ (2)

This question continues on next page.

Fractures:

(2)

c. Justify the procedures adopted when the following incident occurs in a workshop.

Burns:

(4)

