Index Number: _____ SEC37/s3.22s



MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD

SECONDARY EDUCATION CERTIFICATE LEVEL 2022 SUPPLEMENTARY SESSION

SUBJECT: Engineering Technology

PAPER NUMBER: Synoptic – Unit 3
DATE: 1st November 2022
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.

Scenario

- A technician who is working in an engineering company, is required to answer the following questions.
- The questions are about Health and Safety, electricity generation and transmission and documentation.

| Question 1 | K-1 (6 marks) |
|--|--|
| a. Name FOUR different types of electrical pov | ver generation plants. |
| Type 1: | (0.5) |
| Type 2: | (0.5) |
| Type 3: | (0.5) |
| Type 4: | (0.5) |
| b. Define the following terms: | |
| Generation of electrical power | |
| | |
| | (1) |
| Distribution of electrical power | (1) |
| | |
| | (1) |
| c. Describe the FIVE steps by which electrical plant. | power reaches the consumer from the generation |
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| | (2) |
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| Question 2 | K-2 (8 marks) |
| a. List TWO applications of each of the following electromagnetic devices. | |
| Example: Motors and generators: electric vehicles, wind turbines | |
| Relays: | (0.5) |
| Loudspeakers: | (0.5) |
| Microphones: | |
| Transformers: | (0.5) |
| | |
| b. Outline the working principle behind an electromagnet. | |
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This question continues on next page.

c. Describe how a relay achieves its function through its individual parts by referring to Figure 1.

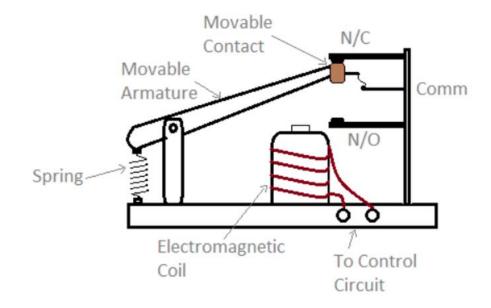


Figure 1: Relay (Source: https://theorycircuit.com/dc-relay-switch/)

| (Source: https://theoryeneur.com/uc relay Switchy) | |
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| | | K-5 (8 marks) |
|-----------|--|---|
| Stepper a | and servo are types of motors. List TWO oth | er types of motors. |
| Type 1: _ | | (1) |
| Type 2: _ | | (1) |
| Match the | | |
| | Table 1: Motor Applica Typical Application | Type of Motor |
| | , | <u>, , , , , , , , , , , , , , , , , , , </u> |
| i. | Electric Vehicles | (1) |
| ii. | Radio-controlled vehicles | (1) |
| Describe | the working principles of the stepper and se | |
| Describe | | |

Please turn the page.

Question 4 K-7 (8 marks)

a. Identify the mechanical systems given in Table 2.

Table 2: Mechanical Systems.

| | Mechanical system | Name |
|------|-------------------------------|-------|
| i. | (Source: shorturl.at/dfsyL) | (0.5) |
| ii. | (Source: https://grabcad.com) | (0.5) |
| iii. | (Source: https://grabcad.com) | (0.5) |

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| c. | List ONE advantage ai | nd ONE disadvantage of ea | pulleys | |
| - | | | | (1) |
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| | | ns that mechanical systems | s are used for. | |
| | | ce: https://www.google.com) | | |
| | | | | (0.5) |
| | iv. | | | |

Question 5 K-9 (8 marks)

a. List the $\mbox{\bf FIVE}$ classes of fires against their type.

| Class of Fire | Type of Fire | |
|---------------|--|-------|
| | Fires involving electrical equipment | (0.4) |
| | Fires involving gases | (0.4) |
| | Fires involving cooking oils | (0.4) |
| | Fires with flammable or combustible liquids as the fuel source | (0.4) |
| | Fires with trash, wood, paper, or other combustible materials as the fuel source | (0.4) |

| | | Fires with trash, wood, paper, or other combustible materials as the fuel source | (0.4) |
|------|--|--|------------------|
| . Fo | r each of the fires mentioned | below, identify the proper fire extinguisher. | |
| i. | A kitchen fire that started in | an oil pan. | |
| ii. | A fire in a seaside trash be containers. | in containing plastic cups and bottles, paper and tal | (0.5) ke-away |
| | | | (0.5) |
| iii. | A fire in an office building ca | aused by faulty extension cords. | |
| | | | (0.5) |
| iv. | . A fire caused by a fuel leak. | | |
| | | | (0.5) |
| De | escribe TWO important practi | ices to adopt when a fire emergency occurs. | |
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| Question 6 | K-10 (8 marks) |
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| . Define the following terms: | |
| Copyright: | |
| | (1) |
| Plagiarism: | |
| | (1) |
| . List FOUR different types of documentation when co | onstructing an electro-magnetic product. |
| Type 1: | (0.5) |
| Type 2: | (0.5) |
| Type 3: | (0.5) |
| Type 4: | (0.5) |
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| | (4) |

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| Q١ | uestion 7 C-1 (12 marks) |
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| a. | Outline the importance of selecting a fuse with the appropriate current rating. |
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| ο. | Calculate and choose the appropriate fuse rating for a lighting circuit that has a total power consumption of 750W, and the supplied voltage is 230V. Show all your workings. |
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| | (4) |
| С. | Discuss the differences between an MCB and a fuse in terms of the following characteristics. |
| | cost sacrificial vs. reset |
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| uestion 8 | C-3 (12 marks) |
| Describe the following preventative measures one should take before using a | a power tool. |
| Inspect plug and cord for defects: | |
| | |
| | (2) |
| Check for damaged switches or faulty trigger locks: | |
| | |
| | (2) |
| Describe the following safety measures one should take while using a power | tool. |
| Wear or use personal protective equipment (PPE): | |
| | |
| | (2) |

This question continues on next page.

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| Follow good housekeeping procedures: | |
|---|-----|
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| | (2 |
| Explain TWO ways of maintenance and care of power tools and machinery. | |
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| | (4) |