higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

MECHATRONIC SYSTEMS
NQF LEVEL 4

(6040334)

22 November 2024 (X-paper)
09:00–12:00

This question paper consists of 4 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)
MECHATRONIC SYSTEMS
NQF LEVEL 4
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Use only a black or blue pen.
5. Write neatly and legibly.

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QUESTION 1

1.1 Explain what is meant by each of the following terms:

1.1.1 Project management

1.1.2 Project planning

(2 × 2) (4)

1.2 Draw a flow chart showing the SIX steps of project planning. (6 × 1) (6)

[10]

QUESTION 2

2.1 Explain the difference between a *design brief* and a *design specification*. (4)

2.2 Draw a pictorial drawing that represents an electro-pneumatic soda can compressing machine. (10 × 1) (10)

2.3 List SIX areas where information can be found when doing research. (6)

2.4 Draw a spider diagram indicating the components that would be used in the construction of an electro-pneumatic soda can compressing machine. (5 × 1) (5)

[25]

QUESTION 3

3.1 List THREE diagrams that can be used to show various stages in an assembly process. (3)

3.2 Explain why it is necessary to produce an evaluation checklist. (2)

3.3 Explain what is meant by the term, *execute a solution*. (2)

3.4 What is the difference between a *flowchart* and a *time chart*? (2 × 2) (4)

3.5 Draw a time chart showing the following SIX sub-tasks over a period of SEVEN weeks under the following headings: Design; Procurement; Manufacture; Assembly; Check installation; and Test and handover. (11 × 1) (11)

3.6 What is the difference between *integrate* and *interface* considering hardware and software? (4)

3.7 Draw a simple PLC ladder functional source code to control the electro-pneumatic soda can compressing machine. (4 × 1) (4)

[30]

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QUESTION 4

4.1 List THREE areas that may need adjustment in the electro-pneumatic soda can compressing machine. (3 × 1) (3)

4.2 Name TWO functions of a sensor in a mechatronic application. (2 × 1) (2)

4.3 Draw a PLC connection/wiring diagram employing a safety control relay in the electro-pneumatic soda can compressing machine. (10 × 1) (10)

[15]

QUESTION 5

5.1 List SIX items that will be present in a technical manual. (6 × 1) (6)

5.2 What is the purpose of a technical manual? (1 × 2) (2)

5.3 Explain the difference between *fatigue* and *wear*. (2 × 2) (4)

5.4 What are the safety considerations that you would put into the technical manual in relation to the electro-pneumatic soda can compressing machine? (4 × 2) (8)

[20]

TOTAL: 100

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