higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

PROFESSIONAL ENGINEERING PRACTICE

NQF LEVEL 4

7 November 2022

This marking guideline consists of 7 pages.

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INSTRUCTIONS TO MARKERS

1. Mark ALL the questions.

2. Read ALL the answers carefully.

3. Follow the answers according to the numbering system used in this question paper.

5. Use only RED ink.

6. Put your ticks and crosses neatly and legibly.

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QUESTION 1

1.1
- Chlorofluorocarbons
- Carbon monoxide
- Carbon dioxide
- Nitrogen oxides
- Solid particles
- Ozone
- Sulphur dioxide (ANY 3 X 1) (3)

1.2
- These chemical substances can catch fire easily and this has a negative effect on the environment, as air is polluted, and forests can be destroyed
- The chemical substances that are dumped into waterways will make rivers, dams, lakes and streams unsafe for agricultural use
- Contaminated water drank by animals and/or humans will have a negative effect on their health as they could become very ill
- Waterways contaminated by chemical waste could have a fatal effect on fish and other water dwellers (ANY 3 X 1) (3)

1.3.1 When an employee has a lack of concentration at work, he or she could cause injuries to him or herself, or other colleagues. ✓ Furthermore, work might be performed incorrectly, which could have a negative effect on the company's productivity and name. ✓ (2)

1.3.2 When an employee is aggressive towards his or her colleagues, it could mean that he or she has a personal problem and does not know how to handle it. ✓ Other workers might feel intimidated and scared, and this might greatly affect their work output. ✓ (2)

1.3.3 When an employee suffers from anxiety, he or she is probably stressed about work performance or any other work related issues such as getting fired. ✓ This will have a negative effect on the person's work output, as he or she will most likely not be able to give full attention to his or her work, and might perform tasks incorrectly, which will cause the person to become even more anxious. ✓ (2)

1.3.4 When an employee's ability to make decisions is reduced, it is a pointer to the fact that the person could have personal problems, or might be intoxicated. ✓ Incorrect decisions could lead to mistakes and reduced productivity, which could lead to the possibility of the company losing its good name in the industry. ✓ (2)

1.4.1 Trees play a vital role in the controlling of the climate. ✓ Forests store a large amount of carbon dioxide, hence, when trees are removed or burned, the stored carbon dioxide is released into the atmosphere, ✓ and acts as a greenhouse gas. ✓ Global warming is caused through these emissions, and results in erratic weather patterns, such as floods, melting of the ice cap and rising of the ocean. ✓ (4)

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1.4.2 A large number of land animals lives in forests. Hence, clearing the forests of trees and vegetation means that the animals that lives in those forests are threatened, ✓ and could face extinction. ✓ Animals have to migrate from their usual, now destroyed, habitat, to other habitats, and this could cause overpopulation. ✓ This could result in lack of shelter, water and food for the animals. ✓ (4)

1.5
- Ensuring the professional behaviour of body members
- Protects the interests of itself and their members
- Protects the interests of the public
- Protects the interests of the environment
- Upholding their good name and reputation
- Maintaining member standards and academic accreditation
- Ensure honesty and responsibility amongst their members towards clients and employers (ANY 3 X 1) (3)

[25]

QUESTION 2

2.1
(i) Identify the need or problem
(ii) Research the need or problem
(iii) Brainstorm as many concept solutions as possible
(iv) Select final concept solution
(v) Design prototype
(vi) Test prototype against set specifications (6)

2.2.1 Scaled physical models shows what the product will look like and its basic functions. ✓ The scaled physical cannot be tested. ✓

2.2.2 Mathematical models are governed by mathematical formulae and systems ✓ Any changes to the model must be made by changing the mathematical formulae, ✓

2.2.3 Simulations are the actual functioning✓ of the product being simulated, eg on a computer. ✓

(3 X 2) (6)

2.3.1 False

2.3.2 False

2.3.3 True

2.3.4 True

2.3.5 True

(5 X 1) (5)

2.4.1 Concepts indicated in the Concept Selection Matrix are the final few possible solutions to the design problem ✓ that were selected from the various possible solutions brainstormed. ✓

2.4.2 Criteria are the various standards ✓ by which the concepts are measured against. ✓

2.4.3 Weighting factors are numbers between 1 and 10 that are assigned to the various criteria ✓ in order to rank them in order of importance. ✓

2.4.4 Rating factors are numbers between 1 and 10 that are assigned to each concept against the various criteria ✓ in order to indicate how well the concepts should perform against the criteria. ✓

(4 X 2) (8)

[25]

QUESTION 3

3.1.1 Sketches

3.1.2 Oblique drawings

3.1.3 Graphs

3.1.4 Logic networks

3.1.5 Detail drawings

(5 X 1) (5)

3.2.1 B

3.2.2 M

3.2.3 A

3.2.4 C

3.2.5 K

3.2.6 F

3.2.7 I

3.2.8 E

3.2.9 L

3.2.10 D

(10 X 1) (10)

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3.3
- Research and prepare well for presentation
- Use only words that are easy to pronounce
- Speak loudly and clearly
- Show enthusiasm for the subject you are presenting
- Do not hesitate or repeat information already shared
- Do not fidget or walk around
- Ensure that slides are clear (ANY 5 X 1) (5)

3.4
- The phrase “Clamp work piece in vice” is an instruction, and should be in a rectangular symbol
- The phrase “Sharpness of blade” appears in a diamond shape symbol, and should appear in question form: “Is the blade sharp?”
- With the answer “No” to the sharpness of the blade issue, the next instruction in the flow chart is to replace the blunt blade with a sharp blade. Following this instruction, there is no further action, as there are no arrows flowing from this instruction to indicate the flow from there.
- The question “Is the length of the work piece within tolerance” is depicted in a rectangular shape symbol. It must be depicted in a diamond shape symbol.
- Following the question “Is the length of the work piece within tolerance”, two possible answers must be indicated on the flow chart: “Yes” and “No”. The “No” answer is indicated on the flow chart, but the “Yes” answer is not indicated. (5 X 1) (5)

[25]

QUESTION 4

4.1 The computer receives raw data from the user. ✓ Through a programme using mathematical calculations and logic, ✓ the computer changes the raw data into information that can be processed and analysed further. ✓ The information is displayed as output to the user. ✓ (4)

4.2 Primary storage is where the computer stores short term data, ✓ which is not retained when the computer is switched off, ✓ while secondary storage is where the computer retains data for the long term, ✓ and the data is not lost when the computer is switched off. ✓ (4)

4.3
- Keyboard
- Mouse
- Scanner
- Microphone
- Digital camera
- Joystick
- Light pen
- Track ball
- Bar code reader ANY (4 X 1) (4)

4.4
- Monitor/Screen
- Printer
- Plotter
- Projector
- Speakers
- Headphones

ANY (2 X 1) (2)

4.5
- Low level computer languages
- High level computer languages

(2)

4.6.1
- Centre
- Bold
- Italics

(3)

4.6.2 ✓ ✓ ✓
=SUM(F6:F13) (3)

4.6.3 ✓ ✓ ✓
=((C6*3)+(D6*1))

OR

✓ ✓ ✓
=(C6*3)+(D6*1)

OR

✓ ✓ ✓
=C6*3+D6*1 (3)

[25]

TOTAL: 100

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