higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING PRACTICE AND MAINTENANCE
NQF LEVEL 3

XX February 2020

This marking guideline consists of 6 pages.

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QUESTION 1: TECHNOLOGICAL SOLUTIONS IN ENGINEERING

1.1
1.1.1 C
1.1.2 A
1.1.3 D
1.1.4 C
1.1.5 B
1.1.6 A
1.1.7 A
1.1.8 D

(8 × 1) (8)

1.2 1.2.1
- When designing for quality, the focus is on making sure the design or product is of the highest quality.
- With life cycle design, engineers focus on all the aspects of the design process or life cycle to make sure the final product is successful.

1.2.2
- Prototypes are small working models of design solutions.
- Models help engineers to develop ideas into approximations or representations of real products, processes or systems.

1.2.3
- Sodium grease is commonly used on automotive chassis but it cannot be used for parts that get wet or are under water because it dissolves in water.
- Aluminium grease has the ability to become long and stringy which makes it suitable for use in large slow turning parts.

(3 × 2) (6)

1.3
- Identifying and defining the exact problem or need that needs to be solved to consider the different parts that have to be solved.
- Researching various solutions to know how to analyse each solution to see if it suits the problem the engineer is dealing with.
- Developing ideas to help solve the problem and possibly design a new solution.
- Communicating the solutions and testing them to see which one works best and which one does not work.
- Comparing and evaluating the different solutions and designs
- Developing the final solution or design and implementing it or putting it into practice.

(6)
[20]

QUESTION 2: FAULT FINDING TECHNIQUES

2.1 2.1.1

- Is there dust or dirt that is blocking any part of the product or system?
- Are the different components securely attached?
- Are there any components damaged or broken?
- Are all the components present?
- Do all the components match the manufacturer's specifications?
- Are any of the components badly rusted or worn?
- Are all the components in the right position?
- Is the power supply working?
- Is there any smoke or emission coming from the product or system?
- Are there any obvious faults or flaws that can be seen?

(Any relevant 4 × 1) (4)

2.1.2

- Are there any unusual noises?
- Is there extreme or too much noise or vibrations?
- Can you hear that the motor is not running well because there is not a constant, regular hum?
- Are there abnormal vibrations? (4)

2.2 2.2.1

- A failure in a system happens when the product or system does not perform as expected.
- A fault is when a part in the product or system has broken down or is not working.

2.2.2

- Setting up a system to fail is done so that the parts which are affected could be seen as well as those not affected.
- Simulations are used to diagnose faults and their causes before the equipment or machinery is in operation.

(2 × 2) (4)

2.3

2.3.1 C
2.3.2 H
2.3.3 A
2.3.4 E
2.3.5 D
2.3.6 B
2.3.7 G
2.3.8 F

(8 × 1) (8)

[20]

QUESTION 3: DIAGNOSIS OF MECHANICAL AND ELECTRICAL FAULTS

3.1
- Look for components which have burnt out or which tend to wear first.
- Look for malfunctions in coils, motors, transformers and other devices with wirings.
- Look for loose connections.
- Finally check for faulty wiring. (4)

3.2
- Establish the user or customer's concern or problem and prepare and plan for the diagnostic work.
- Verify the symptoms through observation and gathering information.
- Define the problem area.
- Identify the possible cause of the fault. (4)

3.3

SYSTEMATIC SEARCH METHOD	RANDOM SEARCH METHOD
• Provides a step-by-step process so that it is clear what to do first and what to do second, etc.	• Provides no process, but uses a hit and miss method
• Planned, logical	• Unplanned, haphazard
• Provides a process to help you investigate symptoms, locate faults and repair causes	• Might not be able to tell the difference between symptom, fault or cause
• Provides a process for • helping you verify faults	• Cannot verify the fault if you cannot tell the difference between symptoms and faults
• The cause is cured or treated, not the symptom	• Easy to mistake a symptom for a real fault and only repair the symptom
• Efficient and uses resources and aids effectively and not wastefully	• Can spend a lot of unnecessary time, money and resources looking for faults

(Any 4 × 2) (8)

3.4
- The workplace address
- Type of equipment
- Age of the equipment
- Tests completed
- Faults
- Recommendation action
- Name and signature of engineering plant technician
- Name and signature of the supervisor (Any 4 × 1) (4)

[20]

QUESTION 4: LUBRICANTS AND LUBRICATION SYSTEMS

4.1
4.1.1 True
4.1.2 True
4.1.3 False
4.1.4 True
4.1.5 False
4.1.6 True
4.1.7 True
4.1.8 False

(8 × 1) (8)

4.2
4.2.1 A force feed lubrication system delivers an ongoing flow of lubricant under pressure to the points that need it. When a machine starts, the flow of lubricant starts. When the machine stops, the flow of lubricant stops.

4.2.2 A dry sump lubrication system is used on large engines that need a large amount of lubrication that can reach high temperatures, but must be cooled.

4.2.3 A manual feed lubrication system is done by hand usually with a grease gun, oil can or brush.

(3 × 2) (6)

4.3
- Leaks can cause a drop in system pressure.,
- This can decrease the efficiency of the system, especially of air tools.
- Leaks can force the equipment to cycle more frequently, which shortens the life of almost all system equipment.
- Leaks can increase maintenance requirements.
- During this time the user does not have access to the system.

(Any 2 × 1) (2)

4.4
4.4.1 The hydrostatic principle means that there must be a balance of force against the two surfaces that are in contact with each other and this is achieved by lubricating the two surfaces.

4.4.2 The hydrodynamic principle means that lubricants are used to separate moving (dynamic) parts in a system by creating a thin film or oil so that they do not wear through friction.

(2 × 2) (4)
[20]

QUESTION 5: PLANT MAINTENANCE

5.1
- Put up demarcation and safety signs.
- Use safety equipment.
- Use personal protective equipment.
- The safe use of machinery is important.
- Ensure safe conditions. (4)

5.2
- Details about the machine such as identity number of the machine and the model
- Date of the inspection and maintenance
- Details about the conditions of the equipment before the maintenance began, including details of items that need special attention
- The tools and consumables used during maintenance task
- The time it took to do the maintenance
- Names of those involved
- Tests and procedures followed, faults found, repairs and replacements done
- The engineer's comments, observations and recommendations for future maintenance tasks (Any 4 × 1) (4)

5.3
- Extraction plant involves processes of removing or mining minerals from the earth such as coal, gold, diamonds, iron ore, platinum and oil.
- Power plant is a processing plant, where raw materials such as coal are processed into energy, such as electricity. (2 × 2) (4)

5.4
5.4.1 Plant
5.4.2 Processing
5.4.3 Removing
5.4.4 Drill
5.4.5 Conveyers
5.4.6 Fire
5.4.7 Hazards
5.4.8 Dangerous

(8 × 1) (8)
[20]

TOTAL: 100

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