higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING PROCESSES
NQF LEVEL 4

23 November 2023

This marking guideline consists of 5 pages.

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QUESTION 1

1.1
- The storage space should be well ventilated.
- It should have clearly marked danger signs.
- Each unit must have a content register itemising the chemicals stored there.
- No other items are allowed to be stored with dangerous chemicals as they can react with each other and cause explosions.
- The floor should be free from obstacles. (Any 4 × 1) (4)

1.2 1.2.1 Pumps and gearboxes can be checked by hand for correct the alignment.

1.2.2 The V-belt and chain drives must be checked for alignment by keeping a straight edge and making sure that it is touching the sprockets. (2)

(2 × 1) **[6]**

QUESTION 2

2.1
2.1.1 True
2.1.2 False
2.1.3 True
2.1.4 True
2.1.5 True

(5 × 1) (5)

2.2
- Misalignment
- Oil leaks
- Residue in sump
- Incorrect belt and chain alignment
- Broken shearing pins
- Broken gears, shafts, and shearing pins
- Fluid that leaks under pressure
- Metal fatigue
- Excessive friction
- Overheating
- Overload
- Lack of lubrication (Any 5 × 1) (5)

2.3
- Make sure that the locking devices are put back in the same way that they were removed.
- Use the correct lubricants and check oil leaks.
- Check the rotational direction of parts.
- Check the alignment of the components where possible. (4)

2.4 2.4.1 Select correct equipment and tools✓ that will help you to work on the components without damaging them. ✓

2.4.2 This will help you to make sure you notice✓ if you have indeed fixed the components properly or not. ✓

(2 × 2) (4)

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2.5
- Components and machines are classified✓ into different models that are designed differently✓.
- The parts of each model✓ may only fit that model✓
- Manufactures provide brand names and serial numbers✓ for replacement parts, making it easier to check if whether they conform and have the same tolerances as parts that you are replacing. ✓
- In order to identify defects or defaults on components that might have arisen during manufacturing. ✓ (4 × 2) (8)

[26]

QUESTION 3

3.1
- The specification and tolerances of the dimension
- Special notes that will give clarity about critical parts
- Information about the machine settings
- Production information about checks and inspection intervals (4)

3.2
- If the cutting fluid drops, the cutting tool might be too hot.
- Temperature increases will affect the cutting ability of the tool.
- This will affect the tolerances of the components because the cutting tool won't cut properly.
- Will also affect the surface finish of the components.
- If the cutting fluid is not strong enough, then it will not flush the chips from the cutting area.
- A build-up of chips will block the cutting area and the machine will malfunction. (6)

3.3
- You have to listen to the different noises made by the machines.
- Unusual noises usually indicate that there is something wrong with the machine or the cutting process. (2)

[12]

QUESTION 4

4.1
- An oxyacetylene cutter produces a flame✓ which heats the metal until it becomes red hot. ✓
- When the metal is hot enough, ✓ extra oxygen is released✓
- The oxygen cuts✓ or oxidises the metal. ✓ (3 × 2) (6)

4.2
- It will give you specifications for the components✓ and the type of material you have to cut✓.
- This will also help you✓ to choose a suitable cutting process. ✓
- It will allow you to decide✓ how you are going to cut them✓ (3 × 2) (6)

4.3 A shielding gas has to be applied to the welding zone✓ to prevent the weld from oxidising. ✓ (2)

4.4
- Check if the cutting edge is smooth.
- Check that the tolerances are the same as those specified in the work order.
- Check the surface finish of the components.
- Check that all job specifications have been met. (4)

4.5
- If the cutting speed is too fast or too slow, the blade will become blunt too soon or break.
- You will have to replace the blade. (2)

4.6
- Make sure that guards are on the machines.
- Make sure that you are wearing the correct personal protective equipment.
- Make sure that the teeth of the blades are pointing in the cutting direction.
- Make sure that the workpiece is clamped securely onto the cutting table.
- Make sure that all mechanical adjustments to the machine have been made.
- Make sure that the setting on the machine is correct. (Any 5 × 1) (5)

[25]

QUESTION 5

5.1
- Manufacturing of components is much faster
- More efficiency as computer does not take break.
- Greater accuracy and consistency with each component or finished product.
- More components can be produced in a short period of time.
- Good for mass production. (5)

5.2
- First you will have to match the machine tools✓ with the sequence of the operation you have chosen✓
- Then you must fit the tools✓ in order for each of those operations✓. (2 × 2) (4)

5.3

5.3.1 Post-processor converts the plan✓ into a set of instructions for the machine. ✓

(2)

5.3.2 Once you are satisfied with the process plan✓,the. . you can instruct the post processor to carry out conversion✓ (2)

5.4
- Protects the operator from water spillage.
- Protects the CNC operator from shavings from the machined components.
- Prevents the CNC machine from starting if the door is not closed.
- Allows the CNC operator to monitor the cutting process. (4)

[17]

QUESTION 6

6.1 Neutral flame is a flame made up of equal amounts of gases, ✓ oxygen and acetylene used in oxyacetylene welding. ✓ (2)

6.2 6.2.1 Environmental conditions✓ affect the durability and strength of the joint. ✓

6.2.2 Helps you select✓ the suitable joining method✓.

6.2.3 Enables you to see if the joint✓ will blend with the rest of the materials. ✓

6.2.4 Enables us to check if there are any other joining methods✓ that can achieve the same results at a cheaper cost. ✓

(4 × 2) (8)

6.3 Will enable you to identify✓ if the joint is effective and if not, you can look for an alternative. ✓ (2)

6.4 It is the point where metal will crack or change in shape✓ if placed under load✓ (2)
(Any suitable answer can be accepted)

[14]

TOTAL: 100

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