higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

FITTING AND TURNING
NQF LEVEL 4

XX February 2020

This marking guideline consists of 6 pages.

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QUESTION 1: PUMPS AND COMPRESSORS

1.1
- Casing wear rings
- Impeller wear rings
- Mechanical seals
- Bearings
- Replaceable shaft sleeve (Any 3 × 1) (3)

1.2
1.2.1 True
1.2.2 False
1.2.3 True
1.2.4 False
1.2.5 False
(5 × 1) (5)

1.3
- Open impeller
- Closed impeller
- Semiclosed impeller (Any 2 × 1) (2)

1.4 As the piston moves down, the one-way valve on the inlet side is forced open✓ by atmospheric pressure. Air is sucked into the cylinder✓ as the piston continues to move down. When the piston turns at the bottom✓ and moves up, the one-way valve on the discharge side is forced open due to the increased pressure of the air and the air leaves the cylinder under pressure.✓ (4)

1.5
1.5.1 Check whether it is clogged with dirt.

1.5.2 Check for cracks or damage or signs of air leakage.

1.5.3 Check for blockages and whether or not the valve still opens and releases water as required.

1.5.4 Check if all moving components are still in good enough condition to continue using them.
(4 × 1) (4)

1.6 To reduce the chances of tools being misplaced, lost or damaged (2)
[20]

QUESTION 2: HYDRAULICS AND PNEUMATICS

2.1
- Leakage of hydraulic fluid, which can cause damage to the eyes, intoxication, risk of slipping and environmental damage
- Excessive noise, which can damage hearing
- Electrical shock
- Accidental machine movement, which can cause severe injury (4)

2.2
2.2.1 Hydraulic cylinder
2.2.2 4/3 directional control valves
2.2.3 Pressure-relief valve
2.2.4 Hydraulic pump
2.2.5 Shut-off valve
(5 × 1) (5)

2.3
- Protective foot wear
- Shop coat or overall
- Safety gloves
- Eye protection
- Hearing protection (Any 3 × 1) (3)

2.4 To check whether or not systems are still functioning in accordance with prescripts and regulations (2)

2.5
- Pressure – Pa
- Flow rate – m^3/s or ℓ/s
- Area – m^2 (6)

[20]

QUESTION 3: SURFACE GRINDER

3.1
- Use a wood hammer for thick wheels.
- Support the wheel on a clean floor and tap the wheel at 45° on each side of an imaginary vertical line through the centre of the wheel and about 25 or 50 mm from the periphery of the wheel.
- Check the entire circumference for cracks. (3)

3.2 In peripheral grinding the material removed from the workpiece is parallel to the axis of the grinding wheel, while in face grinding a flat surface is machined perpendicular to the rotational axis of the grinding wheel. (2 + 2) (4)

3.3 3.3.1 Adjust the table trips to the desired length. (1)

3.3.2
- Prevents any damage to the workpiece or grinding wheel
- Allows stopping of the operation clear of the workpiece (2)

[10]

QUESTION 4: CENTRE LATHE

4.1
- Revolving centre
- Dead centre (2)

4.2 4.2.1 Very hard workpieces such as tool steel
4.2.2 Workpieces made of mild steel or non-ferrous metals
(2 × 1) (2)

4.3 4.3.1 A
4.3.2 D
4.3.3 D
4.3.4 D
4.3.5 C
(5 × 1) (5)

4.4
- Outside and inside diameters of the workpiece
- Recesses and depth dimensions
- Threaded, tapped and reamed holes (3)

[12]

QUESTION 5: MILLING MACHINE

5.1 Data given: D = 75 mm ÷ 1 000 = 0,075
S = 22 m/min
T = 8
F = 0,08
N = ? r/min

Solution: $S = \pi \times D \times N$

$\therefore N = \frac{S}{\pi \times D}$ ✓

$= \frac{22}{3{,}142 \times 0{,}075}$ ✓

= 93,359 r/min ✓

f = F × T × N
= 0,08 × 8 × 93,359 ✓
= 59,748 mm/min ✓ (5)

5.2
- Oil level
- Proper lubrication of slides and moving parts
- Safety and emergency stop
- Adjusting levers for feeds and speeds
- Locks on all slides (5)

5.3 5.3.1 Ensures the correct set-up to avoid misalignment and tool breakage

5.3.2 Accurately measures inside dimensions within allowable tolerance (2 × 1) (2)
[12]

QUESTION 6: CNC CENTRE LATHE AND MILLING MACHINES

6.1
- Protect against electric shock
- Prevent slipping
- Protect against heavy falling objects
- Protect against sharp objects on the floor (Any 3 × 1) (3)

6.2 Data given: D = 100 mm ÷ 1 000 = 0,1
S = 20 m/min
N = ? r/min

Solution: $S = \pi \times D \times N$

$\therefore N = \frac{S}{\pi \times D}$ ✓

$= \frac{20}{3{,}142 \times 0{,}1}$ ✓

= 63,65 r/min ✓

The suitable recommended speed would be 65 r/min. ✓ (4)

6.3 6.3.1 On-off functions for other machine functions, such as switching the spindle motor or water coolant on or off – also known as the codes for controlling the auxiliary functions of the machine

6.3.2 Preparatory function for the machine to prepare for a specific machining cycle regarding the tooling itself (2 × 1) (2)

6.4 In absolute programming, the machine wants to know how far it is from program zero at all times, while in incremental programming the machine wants to know in which direction the tool will move and how far it will move from its previous position. (2 + 2) (4)

6.5
- There is less risk of slipping on dirty floors or tripping over mislaid tools or cables.
- Tools, inventory and supplies can be monitored and controlled and are easier to find.
- Productivity increases.
- Space is used more efficiently and machine operators have enough space around them to avoid accidents.
- Equipment is kept clean and regularly checked for defects. (Any 4 × 1) (4)

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6.6 6.6.1 Face tool
6.6.2 Centre drill
6.6.3 Tap/tapping tool

(3 × 1) (3)

6.7
- Import the geometry of the part to be manufactured. If it is not possible, it can be redrawn using the graphical user interface of the CNC programming system.
- Identify the correct tool and sequence of features.
- Post the correct CNC-program to the correct machine. (3 × 2) (6)

[26]

TOTAL: 100

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