higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

FITTING AND MACHINING THEORY N1

31 JULY 2018

This marking guideline consists of 7 pages.

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SECTION A: (GENERAL PRACTICE)

QUESTION 1: OCCUPATIONAL SAFETY

1.1
- Be aware of your work area.
- Know how to start and stop the machine.
- Clean excess oil on or near the bearings and grease caps.
- Replace all guards before you switch on the power.
- Keep the floors and space around machines clear of small objects.
- Work inside the marked boundaries of passageways and walkways.
- Make sure that there is a place for every tool and they are stored after use.
- Ensure that the workpiece is properly secured.
- Never leave tools on the machine.
- Do not sit on or lean against the machine.
- Do not leave a machine unattended while it is operating.
- Do not touch the workpiece while the machine is operating. (Any 5 × 1) **[5]**

OR

1.2 1.2.1 No diesel engine shall be used underground in any mine unless there is sufficient ventilation✓ to render harmless the exhaust gases produced✓ and where there may be a risk of a diesel engine igniting gas✓ or coal dust✓ (4)

1.2.2 No person shall carry or be permitted to carry any drill, tool or loose material on a ladderway in a vertically inclined shaft or winch except so far as may be necessary to execute repairs.✓ (1)
[5]

QUESTION 2: MEASURING INSTRUMENTS

2.1
- Determine the diameter of the cylinder with a ruler.
- Choose the correct extension rod and fit it onto the micrometer head.
- Insert the micrometer in the cylinder and hold the anvil against the cylinder. Turn the thimble out until the opposite anvil nearly touches the cylinder.
- Make small sideways movements with the micrometwer and adjust it slowly outwards. At the same time make small movements cross-ways to make sure that the micrometer is properly aligned in the middle of the cylinder.
- Continue with this movement while slowly adjusting the micrometer until you feel that this movement stops.
- Remove the micrometer and take the reading. (6)

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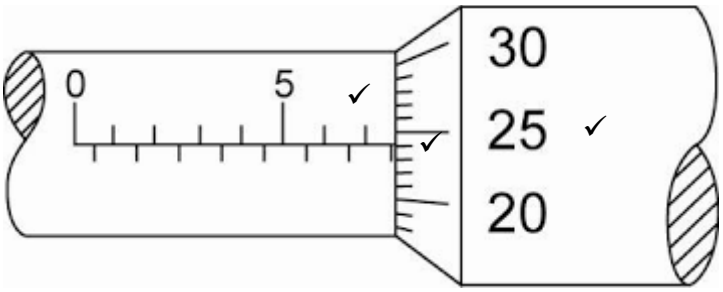
2.2



(3)

2.3
- Outside measurements
- Inside measurements
- Depth measurements (Any 2 × 1) (2)

[11]

QUESTION 3: SCREW THREADS

3.1 3.1.1 Dimension taken across the tops or crests✓ of the screw thread✓ (2)

3.1.2 Dimension across the bottom or roots✓of the screw thread✓ (2)

3.2
- Nuts
- Bolts
- Studs
- Machine screws (Any 2 × 1) (2)

[6]

QUESTION 4: HAND TOOLS

4.1 4.1.1
- Rectangular holes
- Slots
- Keyways (Any ONE)

4.1.2
- Enlarging holes
- Making slots longer
- Finishing off small, internal round corners (Any ONE)

4.1.3
- Filing internal corners with angles bigger than 60°
- Sharpening the teeth of saws (Any ONE)

(3 × 1) (3)

4.2 The metal flattens a little,✓ called a mushrooming effect.✓ (2)

4.3 To slow down the mushrooming effect, the striking end of the chisel has a short taper. (1)

[6]

QUESTION 5: METALS AND PLASTICS

5.1 5.1.1 Cast iron snaps easily.✓Mild steel bends then breaks.✓ (2)

5.1.2 Cast iron cuts easily and produces black crumbly bits.✓ Mild steel turns easily and produces curly shavings.✓ (2)

5.2 Normalising refines the structure of the metal✓ and removes strains caused by cold working.✓ (2)

5.3
- Carburising
- Grain refinement
- Hardening (3)

5.4
- It reduces the grain size.
- It cause a resistance to high temperature.
- It increases the strength of the steel.
- It causes a resistance to corrosion and oxidation. (Any TWO) (2)

5.5 Black (1)
[12]

QUESTION 6: MARKING OFF

6.1
- To scribe lines parallel to the reference surface
- To set a workpiece parallel to the length of a machine table (2)

6.2 6.2.1 To check surfaces at right angles
6.2.2 To support round workpieces in a vertical position
6.2.3 To support workpieces in a vertical position
(3 × 1) (3)
[5]

QUESTION 7: KEYS AND KEYWAYS

7.1 It allows axial movement✓ but restrains radial movement.✓ (2)

7.2 t = D/6
= 160/6✓
= 26,66 mm✓

w = D/4
= 160/4✓
= 20 mm✓ (4)
[6]

QUESTION 8: FASTENERS

8.1
- Set screws
- Cap screws
- Allen screws
- Hexagon socket screws (Any 3 × 1) (3)

8.2 It is a positive locking nut (1)
[4]

QUESTION 9: HAND TAPS, STOCKS, DIES AND REAMERS

9.1
- Drill the hole to the correct size.
- Keep the tap in an upright position.
- Use the correct pressure on the tap wrench so that the tap is pulled into the hole.
- Use a suitable cutting fluid.
- Turn the tap until the correct depth is reached.
- Turn the tap in an anti-clockwise direction often to clear excess material away.
- Use the correct tap. (Any 3 × 1) (3)

9.2
- Circular split die
- Rectangular die (2)
[5]

TOTAL SECTION A: 60

SECTION B

QUESTION 10: DRILLING MACHINES

10.1 10.1.1 Removing metal at the top of the hole✓ so that screws may be set flush with the surface of the metal✓ (2)

10.1.2 Enlarging the upper part of the drilled hole✓ to accommodate round or cap-head screws✓ (2)

10.2
- Incorrect grinding of the point
- Selecting incorrect speeds and feeds
- Abuse and mishandling (3)

10.3
- Improperly ground point
- Feed too heavy
- Lands worn away causing drills to bind in the hole
- Drill clogged with chips causing fracture
- Incorrectly ground or blunt drill point
- Feed too rapid
- Insufficient coolant used (Any 3 × 1) (3)
[10]

QUESTION 11: GRINDING MACHINES AND MACHINE CUTTING TOOLS

11.1
- Material to be ground and its hardness
- Amount of material to remove and finish required
- Wet or dry grinding
- Wheel speed
- Area of grinding contact
- Severity of grinding operation (Any 5 × 1) (5)

11.2
- They cushion flanges against high points or uneven surfaces and distribute the pressure evenly.
- They prevent damage to the surfaces of the flanges.
- They provide better control of friction between the flange and the wheel.

(Any 2 × 1) (2)

11.3
- Red hardness
- Abrasion resistance
- Toughness (3)

[10]

QUESTION 12: CENTRE LATHE

12.1 The workpiece expands as it heats up✓ and could damage the tailstock centre.✓ (2)

12.2
- For tapered or gradually reducing workpieces
- To support a workpiece at the right-hand end (2)

12.3 Three-jaw chucks are self-centering✓ while four-jaw chucks require careful setting up because each jaw moves separately.✓ (2)

12.4
- Any length of work can be cut after taper has been set
- Centres are not disturbed and remain aligned for parallel work
- Taper attachment can be set permanently
- The same setting will cut internal and external tapers
- Work can be held by any machining method in the chuck, between centres or on the face plate
- Length of workpiece does not affect setting of attachment

(Any 4 × 1) (4)

[10]

QUESTION 13: MILLING MACHINE

13.1
- Clean the machine after each work period.
- Never use an air hose to remove chips.
- Familiarise yourself with the machine before you use it.
- Wear proper clothing and approved safety goggles.
- Stop the machine before making adjustments.
- Stop the machine before removing chips.
- Never reach over, or near, the rotating cutter.
- Ensure that the work-holding device is mounted solidly to the table and that it is holding the workpiece firmly.
- Do not talk to anyone while operating the machine or allow anyone to start the machine for you.
- Keep the floor around the machine clear of chips and wipe up spilled cutting fluid immediately.
- Place sawdust or oil absorbing compound on slippery floors.
- Be thoroughly familiar with the stop lever.
- Treat any cut and skin puncture immediately.
- Turn off all power to the machine before you open the door to the motor compartment.
- Do not run the saddle or work into the column.
- Use a heavy cloth for protection when you handle milling cutters.

(Any 6 × 1) (6)

13.2.1 Used to cut short leads

13.2.2 Trip the automatic feed at preset positions

13.2.3 Provide better support to the arbour and prevent vibration and chatter when making heavy cuts

13.2.4 Supports the workpiece on the opposite side of the dividing head

(4 × 1) (4)
[10]

TOTAL SECTION B: 40
GRAND TOTAL: 100

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