Downloaded from www.mycourses.co.za

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

APRIL EXAMINATION

FITTING AND MACHINING THEORY N1

4 APRIL 2016

This marking guideline consists of 8 pages.

Copyright reserved

Downloaded from www.mycourses.co.za

Downloaded from www.mycourses.co.za

SECTION A

QUESTION 1: OCCUPATIONAL SAFETY

1.1	1.1.1	False		
	1.1.2	True		
	1.1.3	False		
	1.1.4	False		
	1.1.5	True		
			(5 x 1)	(5)

OR

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

QUESTION 2: MEASURING INSTRUMENTS

2.1	2.1.1	A – Spindle		
		B – Sleeve		
		C – Thimble		
		D – Ratchet	(4 x 1)	(4)
	2.1.2	Depth micrometer		(1)
	2.1.3	FIGURE 1 – READING = 3,54 mm		(2)
2.2	2.2.1	True		
	2.2.2	False		
	2.2.3	False		
	2.2.4	True		
			(4 x 1)	(4)
				[11]

Copyright reserved

Downloaded from www.mycourses.co.za

Downloaded from www.mycourses.co.za

QUESTION 3: SCREW THREADS

3.1 3.1.1 Pitch – is the distance measured axially from a point on one screw thread to a corresponding point on an adjacent screw thread

3.1.2
- The distance that a screw thread will move <u>axially forward in one full revolution</u>.
- With <u>single-start</u> screw threads the lead is equal to the pitch. With <u>multi-start</u> screw threads the lead is equal to the <u>pitch X number of starts</u>

3.1.3 Included angle – angle between two screw-thread flanks

3.1.4 External thread – the v-thread over the outside diameter

(4 x 1) (4)

3.2 Depth = 0,613 x 2,5 = 1,533 (2)
[6]

QUESTION 4: METALS AND PLASTIC

4.1 WHITE CAST IRON
- Crushing equipment
- Grinding mills and grinding balls
- Cams, wearing plates and conduit fittings (2 x ½) (1)

GREY CAST IRON
- Machine tools, machine beds and frames, and engine blocks
- Marking-off tables, surface plates and bathtubs (2 x ½) (1)

4.2 HARDENING
- Steel will only begin to harden when it has a carbon content of at least 0,5%.
- Hardening alters (changes) the molecular structure of the steel sample.
- Property = very hard to the core.

CASE HARDENING
- Steel with less than 0,5% carbon – must be case-hardened.
- Hardens the surface of mild steel to a depth of approximately 2 mm.
- Only hard on the outside and still soft on the inside. (4)

4.3 4.3.1 BRASS – copper and zinc
PROPERTIES - Low melting point, strong and ductile, cast well, corrosion resistant.
USES – Cartridge cases, wire, rods, tubes, water fittings, bolts and nuts.

Downloaded from www.mycourses.co.za

Downloaded from www.mycourses.co.za

4.3.2 BRONZE – copper and tin
PROPERTIES – Resists wear, casts well, corrosion resistant
USES – gears, valves, machine bearings, pump impellers, glands.
(3 x 2) (6)
[12]

QUESTION 5: MARKING-OFF

5.1
- Guide lines are required to indicate the outline of a work piece.
- The exact position of holes, slots and keyways must be clearly marked-off.
- Marking-off serves as a guide for setting the work piece up in a machine.
- It serves as a guide for roughing out purposes. (Any 2 x 1) (2)

5.2 5.2.1 Engineer's square – to check surfaces at right angles (90°) to each other and to lay out lines at right angles to a reference face and flatness of a surface

5.2.2 Angle plate – to support work pieces in a vertical position for marking-off

5.2.3 Measuring tape – for measuring and laying out of long distances OR measurements.

(3 x 1) (3)
[5]

QUESTION 6: KEYS AND KEYWAYS

6.1
- Shaping machine with rigid boring bar
- Milling machine with slotting attachment with vertical movement
- Slotting machine, also vertical movement
- Key-seat machine
- In the chuck of a lathe with axial movement of a rigid boring bar
- Wire cutting process. (Any 4 x 1) (4)

6.2
- A pulley to the shaft of a motor
- The change wheels of a lathe to their shafts
- The driving flange to the spindle of a grinding machine
- A lever to a shaft
- A coupling to a shaft (2)

[6]

Copyright reserved

Downloaded from www.mycourses.co.za

Downloaded from www.mycourses.co.za

QUESTION 7: HAND TOOLS

7.1
- Philips ('Star')
- Flat
- Torx
- Square point (Any 2 x ½) (1)

7.2 After the hole is drilled,✓ use a square file✓ to rough it out, closely to the lines and then finished it off with a HAND file✓ to get the corners 90°✓ (4)

7.3
- Reaching into tight corners during mechanical assembly
- Formation of wire loops; and
- Removal of split pins (Any 1 x 1) (1)

[6]

QUESTION 8: FASTENERS

8.1 Function of locking fluid – locking of internal/external threads by application of a fluid-based adhesive. (1)

8.2
- Symmonds and
- Nyloc
- Ex-nut (exhaust nut)
- Oval nuts (Any 2 x 1) (2)

8.3 False (1)

[4]

QUESTION 9: HAND TAPS, STOCK, DIES AND REAMERS

9.1
- Tapertap (1^{st} tap or nr one tap)
- Intermediate tap (2^{nd} tap)
- Plugtap (bottoming tap) (3)

9.2 TWO types of dies – Split (1) and Solid dies (1) (2)

[5]

TOTAL SECTION A: 60

Downloaded from www.mycourses.co.za

Downloaded from www.mycourses.co.za

SECTION B: MACHINE CUTTING TOOLS AND MACHINES

QUESTION 10: DRILLING MACHINES

10.1
- Good temperature cooling capacity
- Good lubricating qualities
- Good rust-resistance
- Have a long life (in use/storage)
- Be non-toxic
- Low viscosity to assist chips and dirt to settle quickly (Any 3 x 1) (3)

10.2 $N = \frac{S}{\Pi \times D} = \frac{30}{\Pi \times 0{,}012} = 795 \text{ RPM} = 13 \text{ R/second}$ (3)

10.3
10.3.1 False
10.3.2 True
10.3.3 True
10.3.4 True (4 x 1) (4)
[10]

QUESTION 11: GRINDING MACHINES AND MACHINE CUTTING TOOLS

11.1

ADVANTAGES HUNTINGTON WHEEL DRESSER	DIAMOND-TIPPED WHEEL DRESSER
1. It is cheaper than the diamond-tipped wheel dresser	1. It is more expensive than the Huntington wheel dresser
2. It is difficult to control the amount of material removed from the wheel face	2. Every pass removes a controlled amount from the wheel face
3. The star wheels wear down quickly and need replacement	3. Diamonds last a long time
4. It is difficult to keep the face of the wheel parallel to the edge of the work rest because star wheels wear rapidly	4. Diamonds wear slowly, therefore the wheel face is parallel to the edge of the work rest
5. The dresser dulls very quickly	5. The turning movement of the handle and the diamond always presents a sharp cutting edge

(2)

11.2
- Cushion flanges against high points or uneven surfaces and distribute the pressure evenly.
- Prevent damage to the surfaces of the flanges from the abrasive surface of the wheel.
- Better control of friction between the flange and the wheel, thereby providing power to the wheel. (Any 2 x 1) (2)

Downloaded from www.mycourses.co.za

Downloaded from www.mycourses.co.za

11.3 Flanges must not be less than one-third of the diameter of the wheel (1)

11.4 Positive rake – the top rake (wedge angle) is less than 90°
Negative rake – the top rake (wedge angle) is greater than 90° (2)

11.5 Chip breaking – the action of directing the swarf or shaving off the wedge angle of the cutting tool. This may either 'break' the chip or allow a smooth streaming shaving (2)

11.6 Machining of internal diameters (1)
[10]

QUESTION 12: CENTRE LATHE

12.1
- V-Flat
- V-type (2)

12.2
- The chuck can hold a wide range of hexagonal and cylindrical work pieces.
- There are jaws available for external and internal work.
- You can do work on the end face of the work piece.
- You can easily mount the work piece.
- The work piece is clamped concentrical and need not to be clocked.

(Any 3 x 1) (3)

12.3
- Taper turning attachment
- Compound slide
- Setting over of tailstock (3)

12.4
- Higher manufacturing speed
- Accuracy
- Better surface finish
- Easy to machine complex shapes
- Do not require skilled operators
- Lower running costs
- Cutting-tool life is improved (Any 2 x 1) (2)

[10]

Downloaded from www.mycourses.co.za

Downloaded from www.mycourses.co.za

13.1 Universal milling machine

- The table can swing in both directions for helical milling
- The spindle can turn in both directions
- Special attachments enable a horizontal machine to change into a vertical machine and a slotting machine

Plain milling machine

- Plain milling machine is sturdily built.
- Used to produce work where it is important to make heavy cuts. (3)

13.2 13.2.1 Table trips – set the table travel length – determines the cutter's travel over the work piece.

13.2.2 Table trips – set the table travel length – determines the cutter's travel over the work piece.

13.2.3 Arbor support – supports the arbor and machine spindle

13.2.4 Adjustable footstock – supports work pieces held in the chuck off the dividing head

13.2.5 Arbor – connects to the spindle and holds the cutter(s)

13.2.6 Dividing head – used on the table of the milling machine to hold the work piece and divide the circumference in equal holes or teeth

13.2.7 Boring head – it is an attachment whereby you cut internal diameters on a milling machine to any size of diameter

(7 x 1) (7)
[10]

TOTAL SECTION B: 40
TOTAL: 100

Copyright reserved

Downloaded from www.mycourses.co.za