higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

APRIL EXAMINATION

METAL WORKERS' THEORY N1

16 APRIL 2015

This marking guideline consists of 7 pages.

QUESTION 1

1.1 Unsafe condition

1.2 Unsafe condition

1.3 Unsafe act

1.4 Unsafe act

1.5 Unsafe condition

(5 × 1) **[5]**

QUESTION 2

2.1 2.1.1 It is used to enlarge the punch mark for drilling or punching.

2.1.2 It is used for general filing work.

2.1.3 It is used for heavy work such as forging, heavy chipping or driving large pins and shafts into holes.

2.1.4 It is used for cutting metals.

2.1.5 It is used for lining up holes for bolting or riveting.

(5 × 1) (5)

2.2 2.2.1 Outside callipers

2.2.2 Back mark gauge

2.2.3 Sleeve punch

2.2.4 Bevel gauge

2.2.5 Try-square

(5 × 1 (5)

2.3 See the sketches (2)

2.4 $R^2 = V^2 + H^2$
$= (245\ mm)^2 + (328\ mm)^2$
$= 60025\ mm^2 + 107584\ mm^2$
$= \sqrt{167609\ mm^2}$
$= 409,4\ mm$ (3)
[15]

QUESTION 3

3.1 See the sketch (2)

3.2 C = 3,142 x 32 mm
= 100,54 mm (2)

3.3 See the diagram (2)

3.4 See the sketch (4)
[10]

QUESTION 4

4.1 4.1.1 Springs, gears, steam and turbines, surgical instruments, bolts and nuts. (Any 2 × 1) (2)

4.1.2 Gears, gear boxes, cylinder heads, alloy wheels. (Any 2 × 1) (2)

4.2 4.2.1 It is the ability of a metal that allows it to be drawn into a wire without breaking.

4.2.2 It is the property of the metal that allows it to be stretched without breaking, by pressure and hammering.

4.2.3 It is the property of metal that determines at what temperature it will melt.
(3 × 1) (3)

4.3 4.3.1 Galvanised (1)

4.3.2 Pitch circle diameter (1)

4.4 Flat bars, rolled steel joists, universal beams, steel plates, round bars, angle irons, rolled steel channels. (Any 3 × 1) (3)
[12]

QUESTION 5

5.1 5.1.1 It is used for bending steel plates, round and flat bars

5.1.2 It is used for shearing steel plates

5.1.3 It is used for drilling metals

5.1.4 It is used for punching holes in the surface of metals

5.1.5 It is used for bending steel plates and bars
(5 × 1) (5)

5.2
- Wear goggles
- Ensure that the work piece is securely clamped to the drilling table
- Set the machine to the correct working speed
- Do not attempt to stop the drill bit with your hands
- Take note of the position of the emergency stop button or switch
- Lock all the moveable parts of the machine before drilling
- Use a wooden stick to remove the drill shavings from the drill bit

(Any 5 × 1) (5)
[10]

QUESTION 6

6.1
- Pan head
- Countersunk head
- Conical head,
- Snap/Cup head

(4)

6.2 6.2.1 Pitch = 3 x Diameter

6.2.2 Landing = 1,5 x Diameter

(2 × 1) (2)

6.3 6.3.1 It is used on joints where low stress is experiences such as in structural work.

6.3.2 It is used where the bolt head is to be set flush or be in line with the material, and where excessive vibrations are experienced such as in boilers.

(2 × 2) (4)
[10]

QUESTION 7

7.1 7.1.1 Acetylene gas cylinder

7.1.2 Pressure regulator

7.1.3 Flashback arrestor

7.1.4 Welding hose

7.1.5 Welding torch

(5 × 1) (5)

7.2 Welding is commenced at the right-hand side of the plate and continued across the plate in a leftward direction. The blow-pipe follows the welding rod. The torch should be held at an angle between 60 and 70 degrees to the surface of the plate. The welding rod is held at an angle between 30 and 40 degrees to the surface of the plate. (4)

7.3
- Dip an overheated nozzle in the bucket of water
- Clean the dirty nozzle
- Set the welding gases to the correct working pressure
- Check welding hoses for any gas leaks
- Use the correct welding distance between the plate and the nozzle

(Any 4 × 1) (4)

7.4 A mixture of soft soap and water is applied to the tubing or hoses or joints. If there is a leak the soapy mixture will form bubbles and these bubbles will identify the leak. (2)

[15]

QUESTION 8

8.1 It refers to all types of electric arc welding where the molten metal is shielded from the atmospheric by a neutral gas. (2)

8.2
- Leather apron protects the body against ultra violet rays and arc rays.
- Overalls for body protection.
- Safety boots protect the feet against heavy falling objects
- Leather spats for feet protection.
- Leather gloves are used for hands protection.
- Leather yoke protects the back and shoulders from sparks and hot globular metals.

(Any 6 × 1) (6)

8.3 8.3.1 True

8.3.2 False

8.3.3 True

(3 × 1) (3)

8.4
- The generator is complex and has many moving parts which will cause wear.
- Maintenance costs are much higher on the generator than on the transformer.
- The generator is considerably more expensive than a transformer producing comparable welding current.
- Above 200 amperes the magnetic effect of the electric arc created by the direct current causes the arc-blow.

(4)

[15]

QUESTION 9

Mean diameter = 220 + 220 + 12	(1)
= 452 ÷ 2	(1)
= 226 mm	(1)
Circumference = 3,142 x 226 mm	(1)
= 710,09 mm	
Length required for 2 straight pieces	(1)
= 66 mm + 66 mm	
= 132 mm	(1)
Length of material for 1 clamp	(0,5)
= 710,09 mm + 132 mm	(0,5)
= 842,09 mm	
Length of material for 20 clamps	
= 842,09 mm x 20	(0,5)
= 16841,8 mm	(0,5)
	[8]

TOTAL: 100

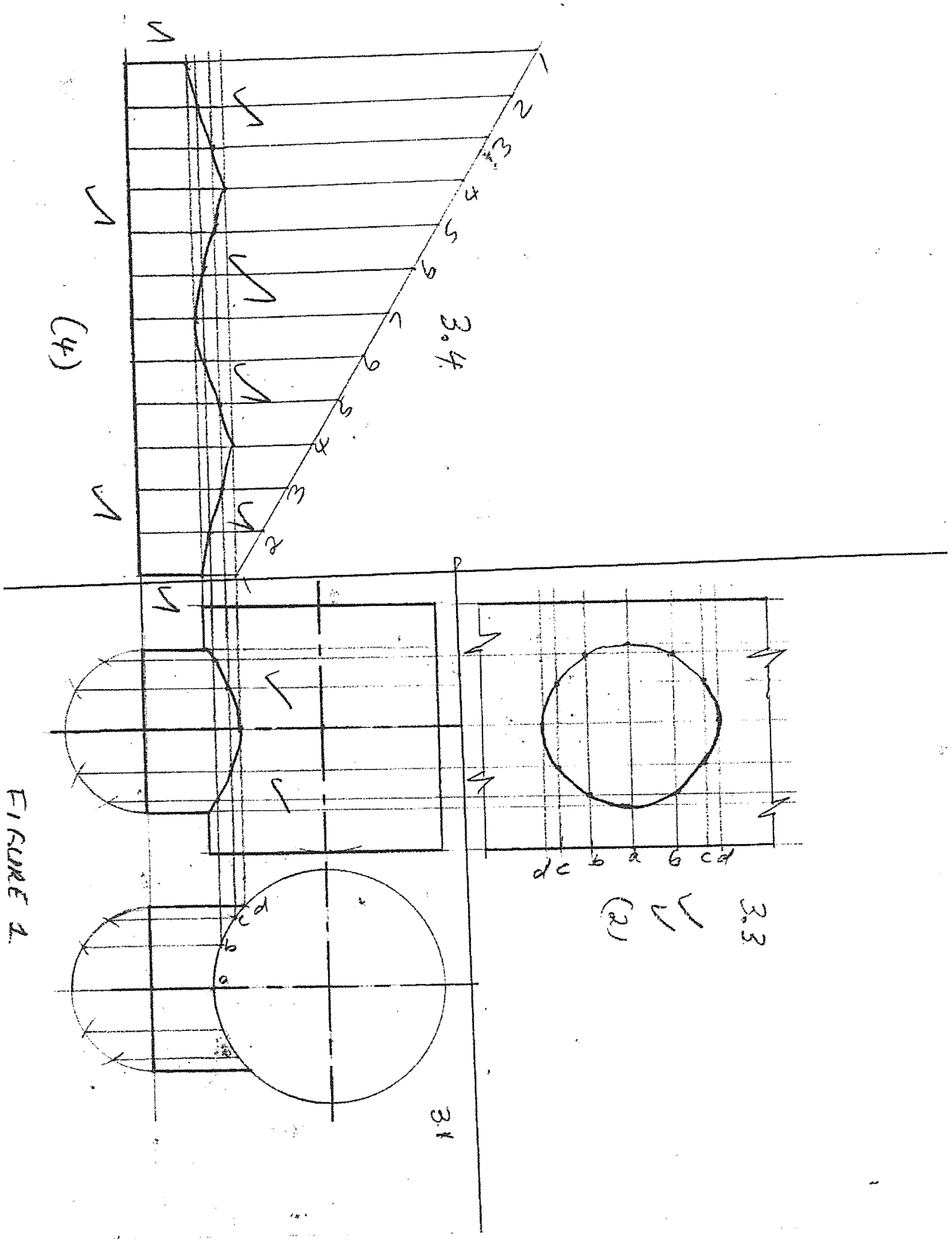

FIGURE 1.