higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

NOVEMBER EXAMINATION

WELDERS' THEORY N2

22 NOVEMBER 2016

This marking guideline consists of 10 pages.

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QUESTION 1

1.1 1.1.1

- Always wear safety grinding goggles when drilling.
- Do not crowd the machine.
- Make sure the workpiece is securely clamped.
- Loose clothing or long loose hair or jewellery should be avoided.
- Only trained people should use the machine.

1.1.2

- Keep fingers clear of the rolls.
- Make sure the workpiece is adequately supported.
- Work near centre of machine.
- Mind the sharp edges of the sheets.
- Do not wear gloves or loose clothing.
- Do not overload the machine. (Any 2 × 2) (4)

1.2

- Do not make any adjustments to the guillotine while it is in operation.
- Wear safety gloves to protect your hands against sharp plate edges.
- Keep your fingers away from the moving guillotine blades.
- Only one person may operate the machine at a time.
- Beware of the hydraulic-plate-held-downs.
- No-one should be behind the machine when it is in operation.
- Only authorised and trained personnel may operate the machine.

(Any 3 × 1) (3)
[7]

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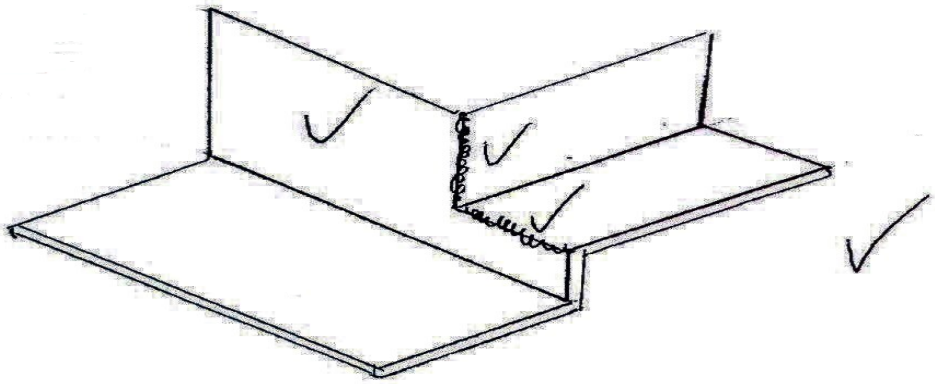
QUESTION 2



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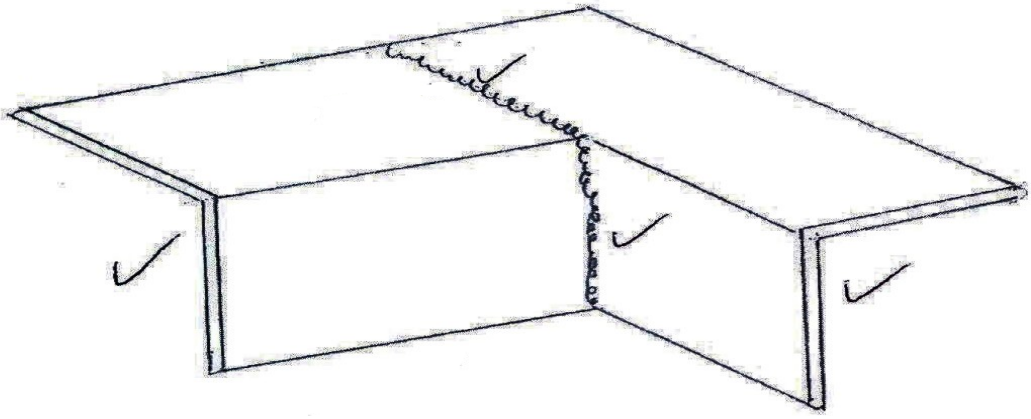

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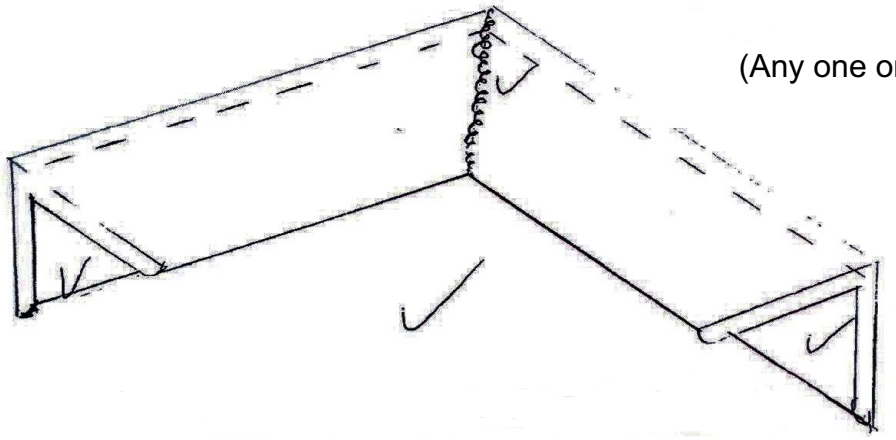
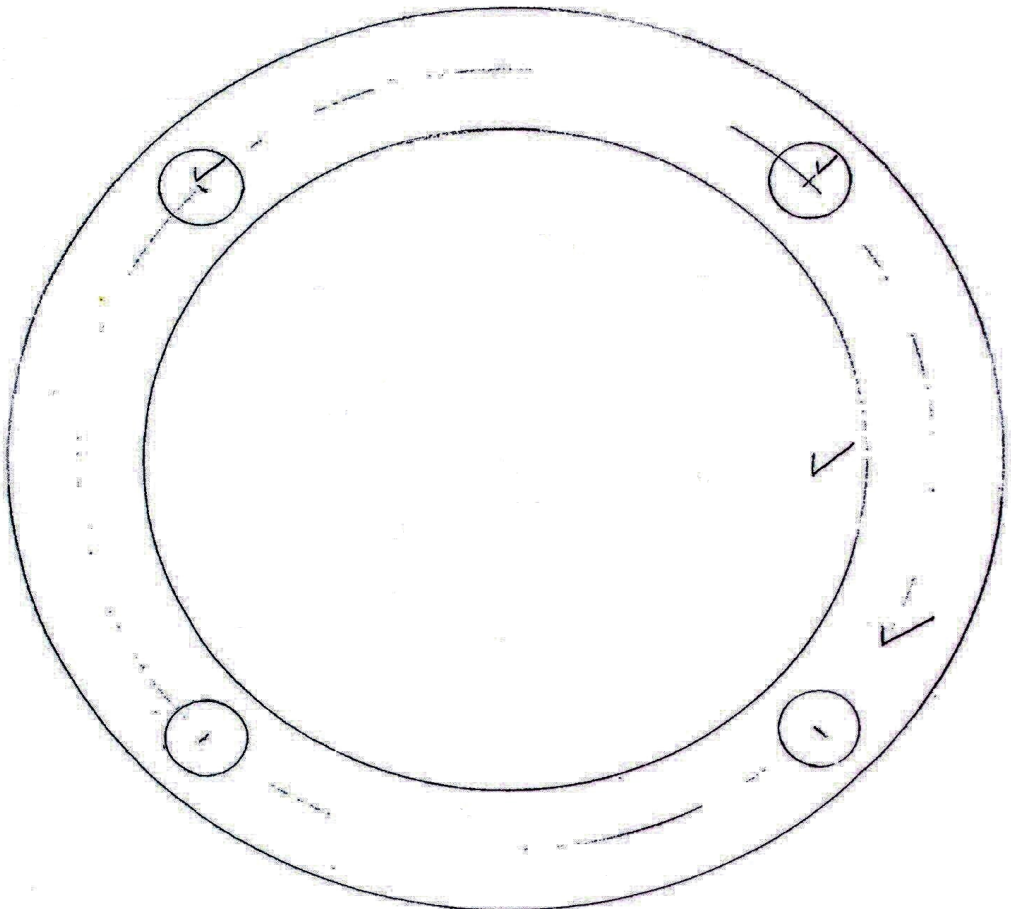


(Any one or similar)

FIGURE 2: Some possible 90° joints of angle irons **[4]**

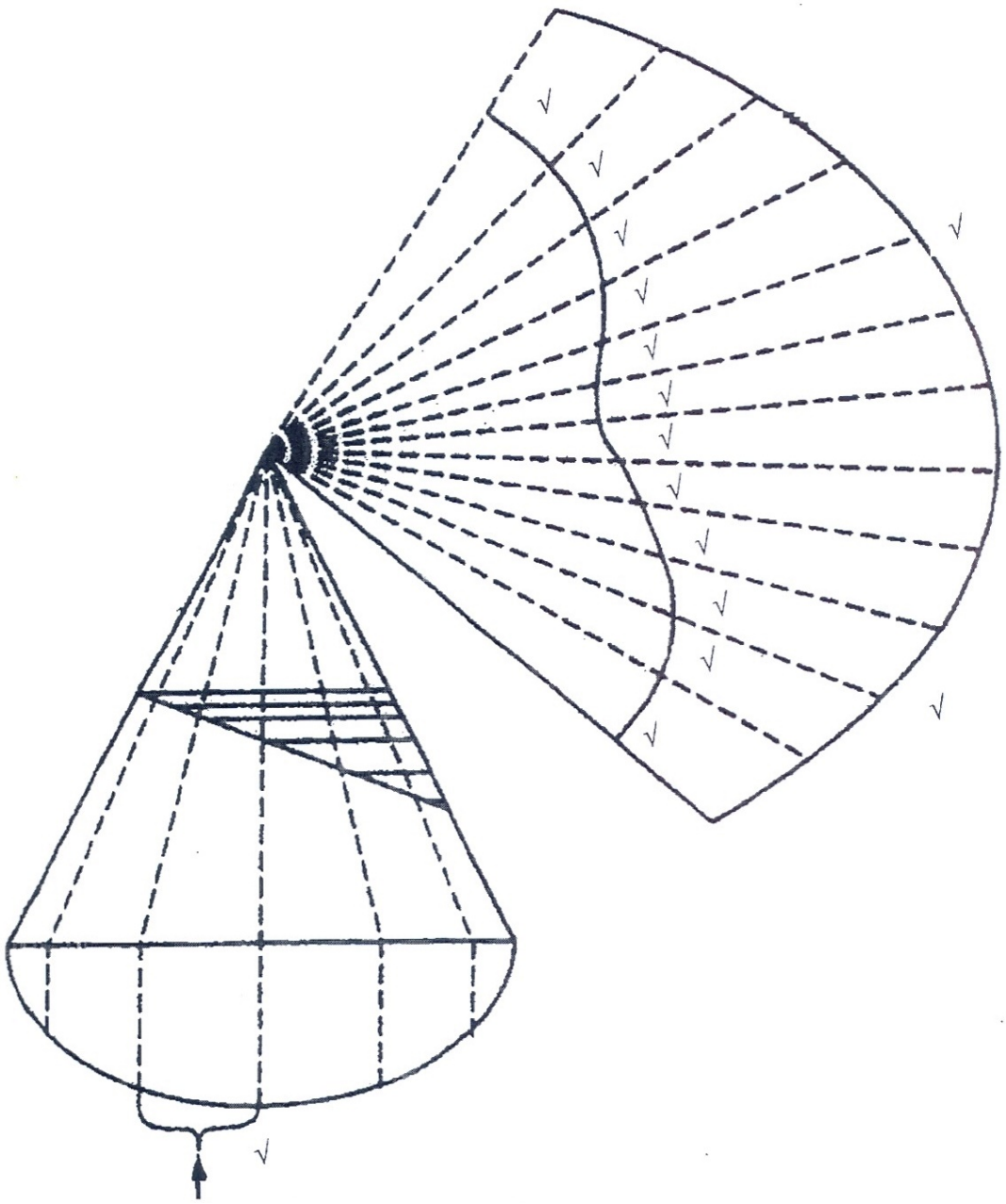
QUESTION 3



[4]

FIGURE 3: Two holes at top horizontally aligned.

QUESTION 4



These divisions are marked off twelve times onto the base arc

TRUNCATED CONE

FIGURE 4: RADIAL-LINE METHOD: OBLIQUELY **[15]**

QUESTION 5

Length of rise = square root of ((run^2) – (rafter^2))
= square root of ((5^2) – (4^2))
= 3 m **[5]**

QUESTION 6

6.1 Carbon √ (1)

6.2 Chrome:
- wear resistant
- magnetism
- shock and heat resistance

Nickel:
- corrosion resistance
- strength and hardness
- fatigue resistance

Tungsten:
- strength and toughness
- dense and fine grain
- magnetic
- wear resistance
- retains hardness under heat

Vanadium:
- refines grain
- wear resistance
- great endurance under repeated load

Manganese
- hardness
- strength
- provides a non-shrinking steel

(at least one of the last three of each of two possible alloy's effects)
(Thus two alloys + one effect off each alloy) (Any 2 × 2) (4)

6.3 6.3.1 A
C (2 x 1) (2)

6.3.2 A
B
C (3 x 1) (3)
[10]

QUESTION 7

7.1
- Always transport gas cylinders in a trolley.
- Never roll or pull cylinders along the ground.
- Never use the cylinders as rollers.
- Never lift cylinders by means of a crane or electromagnet.
- Make sure that the cylinder valves are tightly closed before handling.
- Prevent falling and bumping of cylinders.
- Store cylinders away from direct sunlight.
- Store acetylene and oxygen cylinders separately. (Any 4 × 1) (4)

7.2

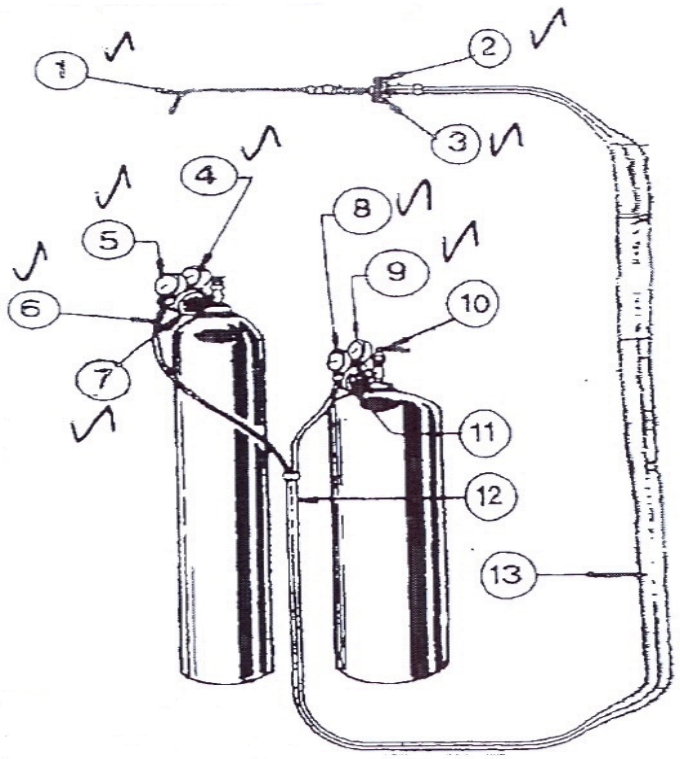
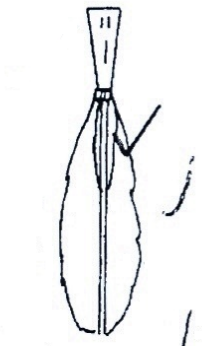


FIGURE 7.2: OAW equipment

1. Blowpipe nozzle
2. Oxygen control valve on blowpipe
3. Acetylene control valve on blowpipe
4. Cylinder pressure gauge
5. Working pressure regulator
6. Oxygen hose
7. Oxygen regulator
8. Working pressure regulator
9. Cylinder pressure gauge
10. Cylinder key
11. Acetylene regulator
12. Acetylene hose
13. Twin hose (Any 9 x 1) (9)

7.3



Too much fuel gas
(correct for cast iron)



Too much oxygen
(pressure too high)



Correct
(for steel)

(9)
[22]

QUESTION 8

8.1 Undercut

- Excessive welding currents
- Electrode at incorrect angle
- Excessive weaving
- Arc-length too long

Under-penetration

- Insufficient heat input, i.e. low amperage
- Welding speed too fast
- Incorrect polarity when using DC current.
- Incorrect joint design, e.g. inaccessible preparation.

Slag inclusion

- Inadequate de-slagging between intermediate runs of multi-run welds.
- Incorrect manipulation of electrode.
- Failure to de-slag and clean tack welds.
- Dirty conditions of material being welded.
- Using electrodes with damaged coating.

Lack of side fusion

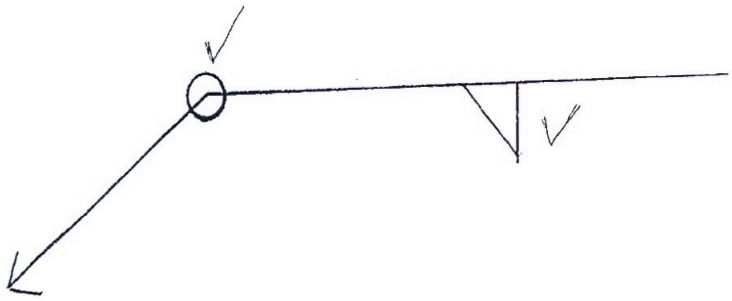
- Poor welding technique usually with incorrect electrode angle
- Incorrect welding conditions, i.e. current setting defects (Any 3 x 2) (6)

8.2 8.2.1 It is the base metal, thus the metal to be welded.

8.2.2 The flame distance from the electrode tip to the base metal is the arc length.

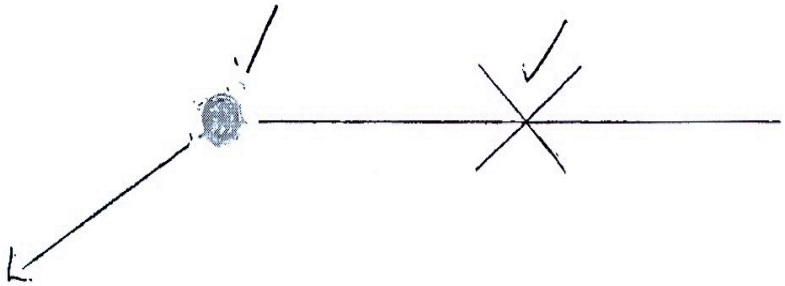
8.2.3 The wire-core and flux-coating making up the rod used in electric arc welding is known as an electrode. (3 x 1) (3)

8.3 8.3.1



A fillet weld on the arrow side in the workshop as shown in the sketch above.

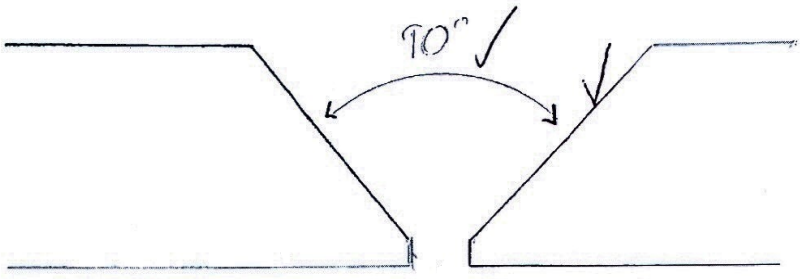
8.3.2



A V-groove weld on both sides on site

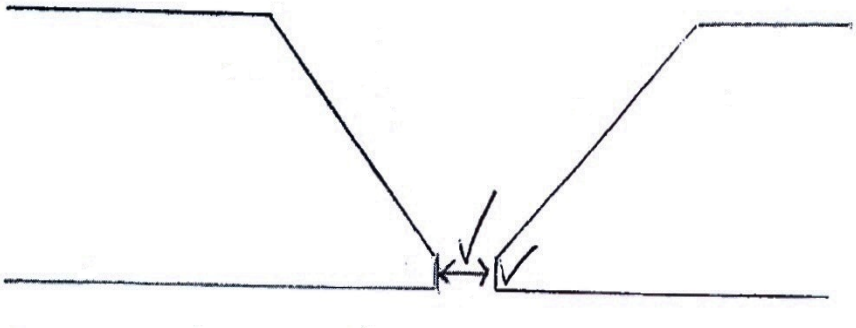
(2 × 2) (4)

8.4 8.4.1 The bevelled (chamfered) part of two parent metals to be joined together cut at an angle on the edges.



Bevelled plate edges

8.4.2 The gap left at the end of the bevelled edges to be welded together



(2 x 2) (4)
(17]

QUESTION 9

9.1 A
B
(2 x 1) (2)

9.2 A
B
C
(3 x 1) (3)

9.3 C
D
(2 x 1) (2)
[7]

QUESTION 10

10.1 Annealing is heating the steel above the upper critical limit√ and then cooling it down slowly.√ The effect is the opposite of hardening. √ (3)

10.2 The steel is heated to a pre-determined temperature√ and quenched (cooled down rapidly) in water√ which forms a new structure of martensite.√ (3)

10.3 10.3.1 A (1)
10.3.2 B (2)
[9]

TOTAL: 100

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