higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING FABRICATION – SHEET METAL WORK
NQF LEVEL 3

(6031023)

10 March 2020 (X-paper)
09:00–12:00

This question paper consists of 8 pages and 1 addendum.

389Q1S2010

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TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Use only a black or blue pen.
5. Write neatly and legibly.

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QUESTION 1

Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1–1.18) in the ANSWER BOOK.

1.1 A/An … furnace is used to produce iron.

A blast
B cupola
C electric
D Bessemer

1.2 The formula … can be used to calculate the area of a triangle.

A A = length × width
B A = πr^2
C A = $\pi r^2 \times h$
D A = ½b × h

1.3 The … on a compressor allows compressed air from the compressor to enter the reservoir tank.

A air valve
B safety valve
C check valve
D air filter

1.4 A … can be used to determine whether a vertical surface is plumb.

A level
B centre head
C tape measure
D trammel

1.5 During the … process, the inert gas is forced and blown out of the nozzle at a high speed while at the same time an electrical arc is formed through the gas from the nozzle to the surface being cut.

A MIG-welding
B plasma-cutting
C laser-cutting
D brazing

1.6 When solid metal vaporises, it becomes …

A liquid.
B slag.
C vapour.
D gas.

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1.7 … is added to the acetylene in a cylinder to absorb the acetylene which enlarges the compression inside the cylinder.

A Oxygen
B Helium
C Argon
D Acetone

1.8 A … weld is made when two pieces join in the form of a T.

A butt
B fillet
C lap
D corner

1.9 An acetylene cylinder is made of 5 mm steel and can withstand a pressure of … bar.

A 40
B 80
C 160
D 320

1.10 The … process is commonly used to weld thin sections of stainless steel and light metals such as aluminium, magnesium and copper alloys.

A GMAW
B SMAW
C GTAW
D Oxy-acetylene gas-welding

1.11 The … defect creates cavities or voids within a weld bead.

A penetration with insufficient fusion
B fusion with insufficient penetration
C porosity
D crack

1.12 … is a possible cause of undercutting during a weld process.

A Gas contamination
B Gun angle
C Too large weld puddle
D Electrode contamination

1.13 The … system allows for one or more heaters and one thermostat per room.

A zoned-control
B radiant-heat
C heat-pump
D ventilation

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1.14 Figure … represents an expansion-joint symbol related to an HVAC system.

A 

B 

C 

D 

1.15 A/An … is installed at the outlet of a ventilation system – normally at the end of intermediate areas.

A inlet duct
B cyclone
C hopper box
D discharge duct

1.16 An unsafe act according to the OHS Act:

A Water, oil or dirt laying on the floor
B Insufficient lighting
C Improperly insulated wires
D Welding with an electrode holder with a cracked casing

1.17 A crane driver should not …

A switch off the machine or allow it to stall with a load in suspension.
B keep his/her eyes on the load.
C always examine the ropes and slings at the start of a shift.
D ensure that the handbrake of a mobile crane is on while the load is hoisted.

1.18 The hand signal for *travel*:

A Arm extended, hand open, wave forearm in the direction of motion
B One hand raised to face level with palm outwards and forearm vertical, other hand indicates desired motion
C Arm extended, forefinger indicating direction of swing
D Arm extended full length above head, palm outwards

(18 × 1) **[18]**

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QUESTION 2

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (2.1–2.9) in the ANSWER BOOK. Give a reason for each answer.

2.1 Do not grip the handle of a hammer too close to the head.

2.2 Open-ended spanners have weak jaws, so it should not be used on very tight nuts or bolts.

2.3 A pedestal drilling machine can drill diagonal/inclined holes in a workpiece.

2.4 A centre punch is used to punch holes to assist with drilling work.

2.5 Odd-leg callipers can be used to scribe a line parallel to the reference face.

2.6 If the end hook of a tape measure is loose, the tape measure is broken.

2.7 The circumference of an oblique round pipe can be calculated by the formula $C = \pi \times D$.

2.8 The common central sphere construction forms part of the connection between a right cone and a cylindrical pipe.

2.9 It is not necessary to set out points during the marking-off process to manufacture components.

(9 × 2) **[18]**

QUESTION 3

3.1 Give the purpose of adding each of the following elements to the furnace mixture during the melting process in iron manufacturing:

3.1.1 Coke

3.1.2 Limestone

(2 × 2) (4)

3.2 Give the carbon-content range of each of the following metals, for example 1,2%–2,1%:

3.2.1 Carbon steel

3.2.2 Cast iron

(2 × 2) (4)

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3.3 Give TWO examples of each of the following groups of materials:

3.3.1 Ferrous metals

3.3.2 Nonferrous metals

3.3.3 Alloy steels

(3 × 2) (6)

3.4 List FOUR safety precautions to take when using shaping machines. (4)

3.5 Name FIVE resources, pieces of equipment or needs of which the location must be known in case of emergency. (5)

3.6 Give THREE methods to avoid hazardous fume vapours of metals and fluxes in a welding bay. (3)

3.7 List FOUR types of cracks that might appear during or after welding. (4)

3.8 Give the first and last steps to follow when shutting down an oxy-acetylene gas flame. (2 × 1) (2)

3.9 List THREE types of heating, ventilation and air-condition (HVAC) drawings or orientations. (3)

3.10 List the FOUR main hazard categories of accidents involving hands and arms. (4)

3.11 List the THREE conditions when head protection must be worn. (3 × 2) (6)

3.12 Give the meaning of the abbreviation *WLL* related to lifting chains. (1)

[46]

QUESTION 4

4.1 A half roof truss has the following measurements:

Run distance: 3,124 m
Rise distance: 2,341 m

Use the theorem of Pythagoras to calculate the length of the rafter. Round off to THREE decimals and give the answer in meter. (4)

4.2

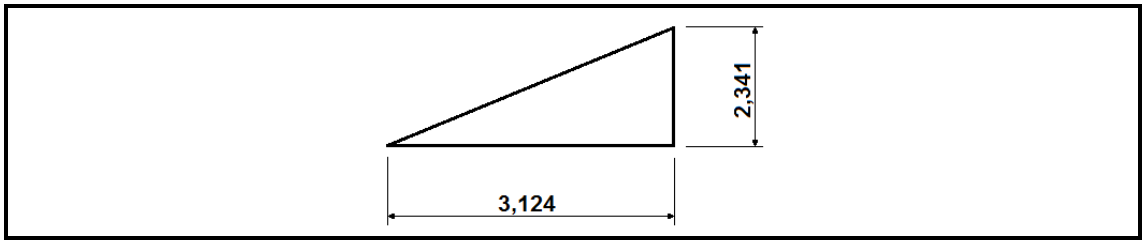


FIGURE 1

Calculate the area of FIGURE 1. Sizes indicated are in meters. Round off the answer to THREE decimals and give the correct unit. (5)

4.3 FIGURE 2 shows a lobster-back bend with the centre-face distance and pipe diameter.

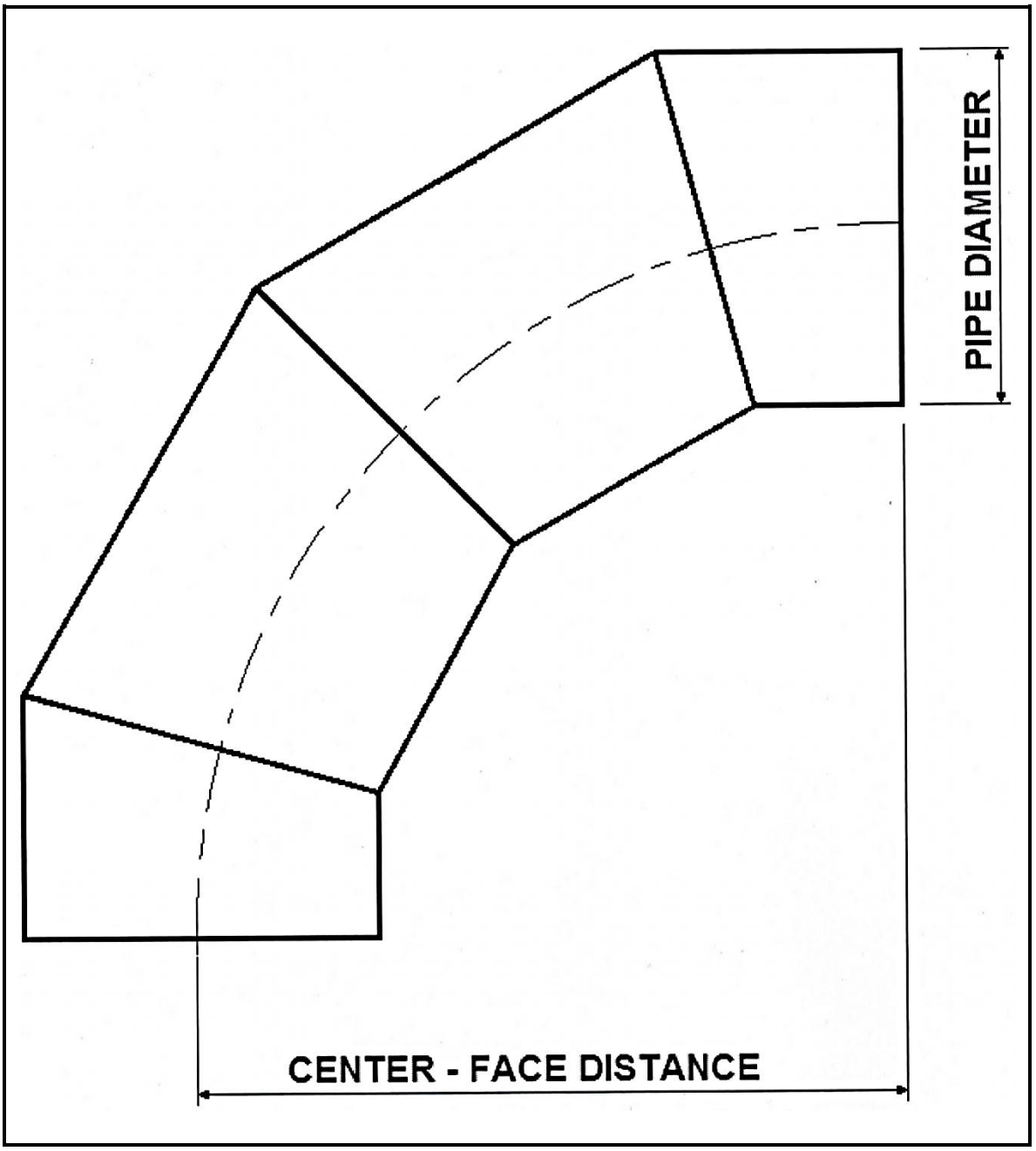


FIGURE 2

Accurately construct the bend by completing the drawing using the indicated reference lines on the ADDENDUM (attached). Use the sizes indicated in FIGURE 2. (9)

[18]

TOTAL: 100

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ADDENDUM

EXAMINATION NUMBER: | | | | | | | | | | | | |

CENTRE NUMBER: | | | | | | | | | | |

Complete the CENTRE NUMBER and your STUDENT NUMBER on the ADDENDUM and submit it with the ANSWER BOOK.

QUESTION 4.3

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