higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING FABRICATION – BOILERMAKING
NQF LEVEL 4

22 November 2024

This marking guideline consists of 6 pages.

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SECTION A

QUESTION 1

1.1
1.1.1 Computer
1.1.2 G
1.1.3 Drawing
1.1.4 Slag
1.1.5 Vertical/upright position
1.1.6 Pythagoras'
1.1.7 Flammable
1.1.8 Extracted
1.1.9 Detail drawing
1.1.10 Carpenter's square

(10)

1.2
1.2.1 C
1.2.2 F
1.2.3 A
1.2.4 D
1.2.5 B

(5 × 1) (5)
[15]

TOTAL SECTION A: 15

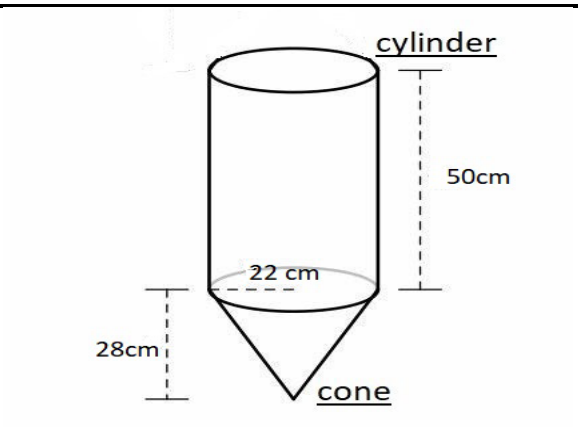
SECTION B

QUESTION 2

2.1
- Access way: A large opening of a vessel which is mainly used for easy maintenance of the vessel.
- Shell: Walls of a container which are thick enough to carry the substance as per the description.
- Nozzle: A short piece of pipe with a flange attached to permit piping to be connected to the pressure vessel.
- Saddle: Steel or concrete supports for horizontal vessels and tanks. (4)

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2.2



Volume of feed in the = $\frac{1}{3}\pi r^2$ h ✓

$= \frac{1}{3} \times \frac{22}{7} \times 11 \times 11 \times 28$ ✓

= 3547,91 cm^3 ✓ (3)

2.3
- Do not take shell covers or head covers off until you have checked that all the pressure in the pressure vessel is relieved.
- When working on big units, make proper rigging arrangements.
- Handle cleaning solvents and the fluid that you drain from the equipment with extreme care during the cleaning process.
- Dispose of the material from the vessel in the appropriate hazardous waste container.
- If the cleaning fluids that you are using are flammable, don't use a high-pressure air-hose to blow out the pipes or nozzles in the pressure vessel.
- Watch out for leaks when in the pressure vessel shell. (Any 4 × 1) (4)

2.4 2.4.1 This is the maximum work pressure at which the equipment can safely operate. (1)

2.4.2
- The substance that the pressure vessel is designed to hold
- The material that the pressure vessel is made of
- The size of the pressure vessel
- The shape of the pressure vessel
- The temperature level at which the pressure vessel is operating

(Any 3 × 1) (3)

2.5 $Plate\ lenght\ of\ part\ of\ a\ circle = \frac{Y°}{360°} \times \pi \times \mathrm{Dm}$

(3)
[18]

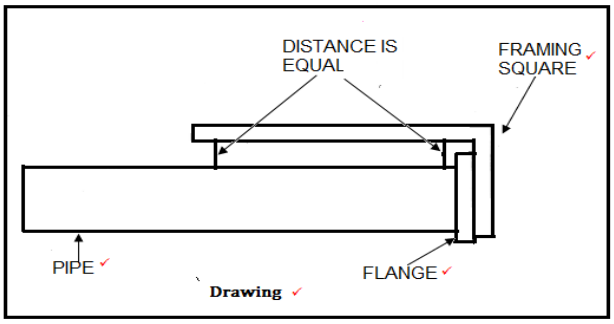
QUESTION 3

3.1 A − Elbow
B − Pressure gauge
C − Valve
D − Reducer
E − 'T' piece (Any 3 × 1) (3)

3.2 3.2.1 Centring head (1)

3.2.2
- Set a centre finder on top of the pipe.
- Adjust it until the bubble indicates the centre point.
- Then give the centric pin a light blow with a hammer.
- The centric pin will make an indentation on the surface of the pipe to mark its centre. (4)

3.3



(4)

3.4 Offset = $\sqrt{Travel^2 - Advance^2}$✓
= $\sqrt{1200^2\text{-}350^2}$✓
= 1147.82 mm✓ (3)

3.5 Prove to her that 30 mm^3 = 30 × 10^{-9} m^3
30 mm^3 = 30 mm × mm × mm✓
= 30 mm/1 000 × mm/1000 mm × mm/1000✓
= 30/ 1000 000 000 m^3✓
= 30 × 10^{-9} m^3 (3)
[18]

QUESTION 4

4.1 4.1.1 X – Column
Y − Brace
Z − Beam (3)

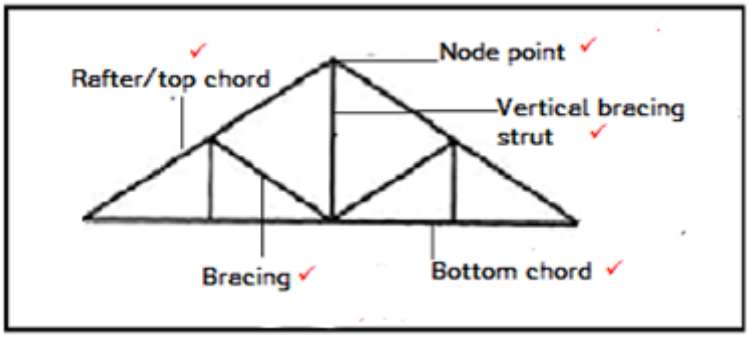
4.1.2 With the aid of a welding machine, join the brace and the column with a fillet. Weld on the side of an arrow. (3)

4.2 4.2.1 Marked or punched steel components identify each member and indicate where they are to be joined. (1)

4.2.2 C1 − Column mark number 1
BR1 − Brace mark number 1 (2)

4.3
- The section size
- Overall lengths of the members
- The position and diameters of all holes
- The positions, types and sizes of all welds
- Dimensions of notches
- Cut-outs and snipes
- Details of all attachments like cleats or brackets, etc. (Any 3 × 1) (3)

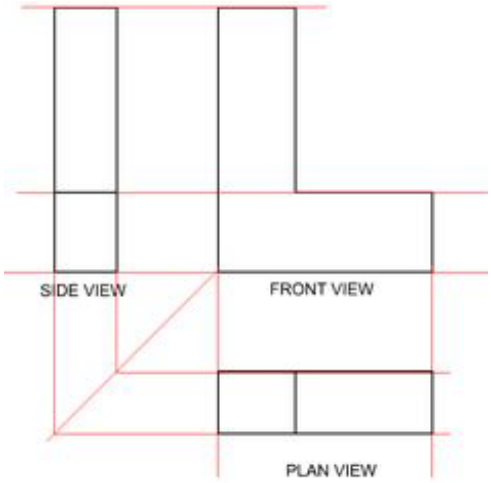
4.4



(Any THREE correct labels as per the drawing above) (3)

4.5 4.5.1 Front view is sitting on top of the plan/top view. (1)

4.5.2



(3)
[19]

QUESTION 5

5.1
- Computer
- Numerically
- Controlled (3)

5.2 'X'
'Y'
'Z' (3)

5.3
- The scale of the drawing
- The plan, section and isometric projections
- The machining symbols
- The machining procedures
- The initial and final size of the workpiece (Any 4 × 1) (4)

5.4 5.4.1 Oblique drawing (1)

5.4.2
- Three surfaces of an object are shown in a single drawing.
- Vertical lines remain vertical.
- Horizontal lines are drawn at 30 degrees to the horizontal. (3)

5.5 5.5.1 Point-to-point: The path is from one point to another defined point.

5.5.2 Continuous path. It allows for a straight line path at any angle and even circular paths.
(2 × 1) (2)

5.6
- Select the correct tools for the specific job
- Check, adjust and replace worn or damaged tooling.
- Troubleshoot common machine faults during and after operation.
- Remove and measure the machine components.
- Complete and process CNC machine records.
- Clean the machine. (6)

5.7
- Engineering and machining industries
- Fabrication industry
- Woodworking industry (3)

5.8 5.8.1 Smaller workpieces are clamped in collet.

5.8.2 Long workpieces on a CNC lathe machine are clamped in automatic tailstock.
(2 × 1) (2)

5.9 5.9.1 5 mm
5.9.2 0,4 mm/rev to 1mm/rev
5.9.3 1 mm
(3 × 1) (3)
[30]

TOTAL SECTION B: 85
GRAND TOTAL: 100

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