Province of the
EASTERN CAPE
EDUCATION

DIRECTORATE SENIOR CURRICULUM MANAGEMENT (SEN-FET)

HOME SCHOOLING SELF-STUDY WORKSHEET ANSWER SHEET

SUBJECT	WELDING & METALWORK	**GRADE**	12	**DATE**	MAY 2020
TOPIC	JOINING METHODS	**TERM 1 REVISION**	( )	**TERM 2 CONTENT**	(√)

ACTIVITY 1 JOINING METHODS (INSPECTION OF WELD)

1.1 **Factors that should be taken into account during oxy-acetylene**.

- Correct flame for the work at hand.
- Correct angle of welding torch and rod.
- Depth of fusion.
- The welding rate. (Any 2)

1.2 TWO causes of incomplete penetration during arc welding:

- Welding current too low.
- Welding speed too fast.
- Incorrect welding angle.
- Poor joint preparation.
- Insufficient root gap.
- Wrong polarity.

- Arc length too short.
- Wrong electrode used. (Any 2)

1.3 TWO precautions to eliminate the following welding defects:

1.3.1 Slag inclusion

- Using well-maintained consumables.
- Ensure adequate shielding gas.
- Clean the joint properly.
- Slag must be removed before welding the next bead.
- Too slow welding movements.
- Electrode too big.
- Wrong or too big weaving action. (Any 2)

1.3.2 Centre-line cracks

- Aiming for a width-to-depth ratio of 1:1.
- Decreasing the current to reduce excess penetration.
- Decreasing welding voltage / current.
- Slowing travel speed.
- Reduce high carbon content in weld.
- Welding while joint is under stress due to joint design, use clamping devices.

1.4 Define porosity of a welded joint

Porosity refers to cavity-type pores (bubbles or gas pockets) formed by gas during the solidification of molten weld metal.

1.5 Explain why non-destructive tests are preferred to destructive tests.

The welded joint is not destroyed in the process of testing.

1.6 **State TWO types of welding defects that are detected when conducting an ultrasonic test onto a welded joint.**

- To detect internal flaws.
- To detect surface flaws.

1.7 Name THREE elements that should be inspected during the **visual inspection** process of a welded joint.

- Shape of profile.
- Uniformity of surface.
- Overlap.
- Penetration bead.
- Root groove. (Any 3)

1.8 Describe the steps to be followed when performing a nick-break test on a welded joint.

- Make a hacksaw cut at both edges, through the centre of the weld.
- Place specimen on two steel supports.
- Use a sledge hammer to break the specimen in the area of the cuts.
- Inspect the exposed weld metal in the break for incomplete fusion, slag inclusion, etc.

ACTIVITY 2 JOINING METHODS (STRESSES AND DISTORTION)

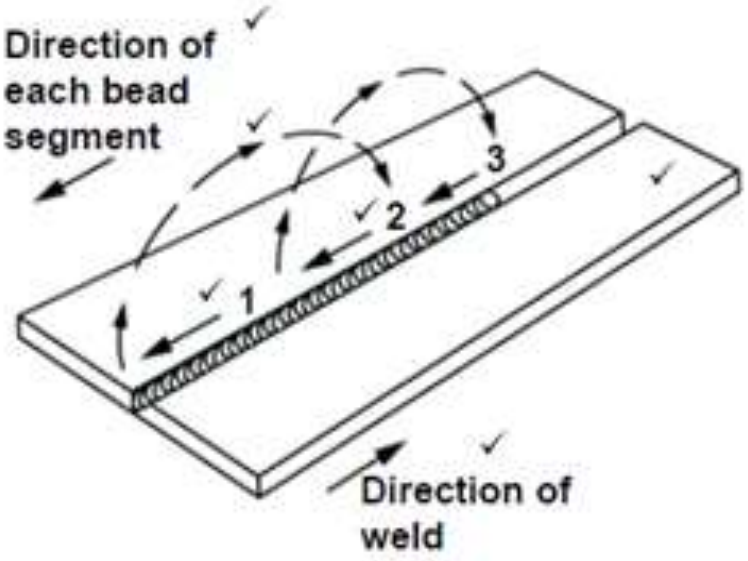
2.1 **Describe the meaning of shrinkage in a welded joint.**

Shrinkage is a form of plastic deformation where the metal has deformed as a result of contraction on cooling.

2.2 **State FOUR factors that affect distortion and residual stress during welding.**

- If the expansion that occurs when metal is heated is resisted, then deformation will occur.
- When contraction that occurs on cooling is resisted, then a stress will be applied.
- If that applied stress causes movement, then distortion occurs.
- If the applied stress does not cause movement, then there will be residual stress in the welded joint.

2.3 Explain back-step welding as a method to reduce distortion by using a neatly labelled sketch.



2.4 **State FOUR factors that affect the temperature at which cold-worked steel will recrystallise when heated.**

- The prior amount of cold work.
- The temperature and time of annealing process.
- Composition of the metal.
- The melting point.