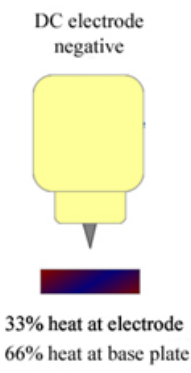
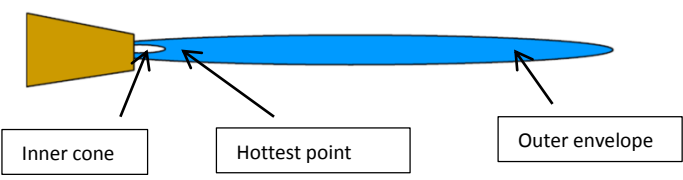
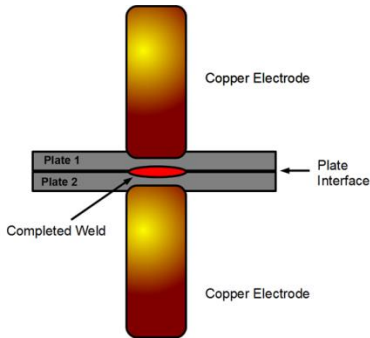
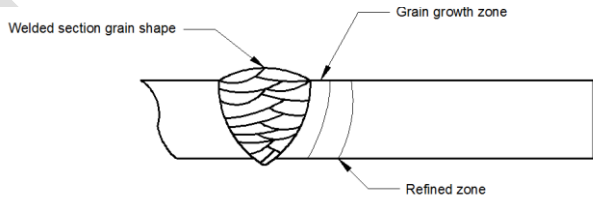
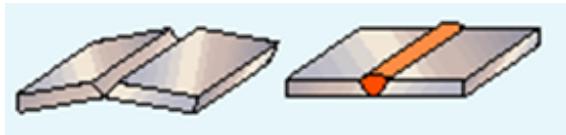
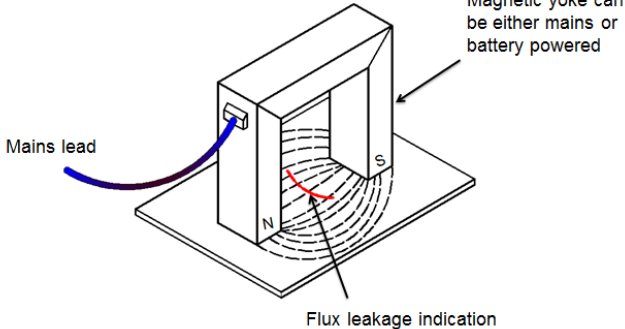
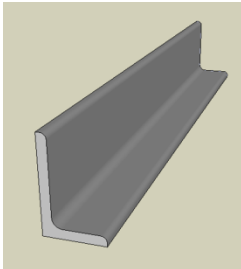
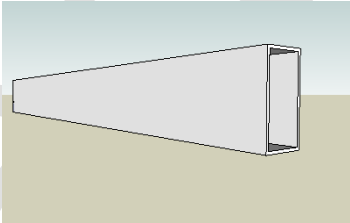


Question no.	Syllabus ref.	Question	Marks
1 Marking guide / answer	01.01	<p>a)</p>  <p>b) Arc blow is caused by a build-up of magnetism within the fabricated component causing the arc to wander.</p> <p>c) Any <b>one</b>: Use AC, change direction of weld, move current return lead or any other acceptable answer.</p>	<p>(3 marks)</p> <p>(2 marks)</p> <p>(1 mark)</p> <p>(Total 6)</p>
2 Marking guide / answer	01.02	<p>a) Any <b>two</b>: rutile, basic, cellulosic, iron powder.</p> <p>b) Any <b>four</b>: Produce a shielding gas, produces a slag coating, helps initiate the arc, directs the arc, reduces cooling rate, provides weld contour or any other acceptable answer.</p>	<p>(2 marks)</p> <p>(4 marks)</p> <p>(Total 6)</p>
3 Marking guide / answer	01.03	<p>a) Helium and Hydrogen.</p> <p>b) Any <b>four</b>: Weld profile, mode of metal transfer, penetration, welding speed or other acceptable answer.</p>	<p>(2 marks)</p> <p>(4 marks)</p> <p>(Total 6)</p>
4 Marking guide / answer	01.04	<p>Flame diagram <b>must</b> show a rounded inner cone for full marks.</p> 	<p>(3 marks for correct diagram)</p> <p>(1 mark each for label)</p> <p>(Total 6)</p>
5	02.01		

Question no.	Syllabus ref.	Question	Marks
Marking guide / answer		<p>The diagram shows a T-joint weld. A vertical leg is attached to a horizontal base. Labels include: 'Leg length' with arrows pointing to the height of the vertical leg and the width of the horizontal base; 'HAZ' (Heat Affected Zone) pointing to the area around the weld; 'Nominal throat' pointing to the depth of the weld groove; and 'Toe' pointing to the outer edges of the weld.</p>	<p>(2 marks for sketch)                      (1 mark each label)                      (One label only for each leg length and toe acceptable)</p> <p>(Total 6)</p>
6 Marking guide / answer	02.02	<p>a) i)</p> <p>ii)</p> <p>b) i)</p> <p>ii)</p>	<p>(2 marks)</p> <p>(2 marks)</p> <p>(1 mark)</p> <p>(1 mark)</p> <p>(Total 6)</p>
7	02.03	a) Sketch should show either double Vee, J or U butt.	(2 marks)

Question no.	Syllabus ref.	Question	Marks
Marking guide / answer		<p>b) Benefits vary depending on joint.</p> <ul style="list-style-type: none"> <li>• Double Vee – balanced welding, reduced weld volume.</li> <li>• J or U – access to one side only, less distortion.</li> <li>• Or any other acceptable answer for either.</li> </ul>	<p>(2 marks)</p> <p>(Total 4)</p>
8 Marking guide / answer	03.01	<p>a)</p>  <p>b)</p> <ul style="list-style-type: none"> <li>• Low voltage, high amperage currents are passed through the joint.</li> <li>• Heat is generated when an electrical current flows through a resistance.</li> <li>• Resistance is greatest at the plate interface.</li> </ul>	<p>(2 marks)</p> <p>(3 marks)</p> <p>(Total 5)</p>
9 Marking guide / answer	03.02	<p>a) &amp; b)</p>  <p>c) Columnar.</p>	<p>(1 mark for sketch)</p> <p>(1 mark for correct grain shape)</p> <p>(1 mark for each correct zone label)</p> <p>(1 mark for columnar)</p> <p>(Total 5)</p>
10 Marking	03.03	a) Distortion is caused by uneven expansion and contraction or degree of restraint. Do <b>not</b> accept heat	

Question no.	Syllabus ref.	Question	Marks
guide / answer		<p>as a cause.</p> <p>b)</p>  <p>Plates are set at an angle and the weld distortion causes the plates to return to flat.</p> <p>c) Any <b>one</b>: any restraint method, Skip welding, Back-step welding, Strong-backs or any other acceptable answer.</p>	<p>(2 marks)</p> <p>(1 mark)</p> <p>(1 mark)</p> <p>(1 mark)</p> <p>(Total 5)</p>
11 Marking guide / answer	03.04	<p>a) Any <b>three</b>: Porosity, undercut, cracking, lack of fusion or any other acceptable answer.</p> <p>b) Depending on answer to a), any acceptable answer.</p>	<p>(3 marks)</p> <p>(2 marks)</p> <p>(Total 5)</p>
12 Marking guide / answer	03.05	<p>a)</p>  <p>b)</p> <ul style="list-style-type: none"> <li>The electrical flow through the metal creates a magnetic effect.</li> <li>Iron filings suspension sprayed on the surface are attracted to the defect.</li> </ul>	<p>(3 marks)</p> <p>(2 marks)</p> <p>(Total 5)</p>
13 Marking guide /	03.06	<p>a) Description similar to the following.</p> <ul style="list-style-type: none"> <li>Cut through the weld.</li> </ul>	

Question no.	Syllabus ref.	Question	Marks
answer		<ul style="list-style-type: none"> <li>• Polish cut surface.</li> <li>• Apply etchant.</li> <li>• Clean off etchant.</li> <li>• Inspect joint.</li> </ul> <p>b) Any <b>three</b>: Bend tests (root, face, side), fracture (nick break), cupping test (ductility).</p>	<p>(2 marks)</p> <p>(3 marks)</p> <p>(Total 5)</p>
14 Marking guide / answer	04.01	<p>a)</p> <p>i)</p>  <p>ii)</p>  <p>b) Any <b>two</b>: Copper, brass, titanium, aluminium, aluminium alloys or any other acceptable answer. c) Zinc.</p>	<p>(1 mark)</p> <p>(1 mark)</p> <p>(2 marks) (1 mark)</p> <p>(Total 5)</p>
15 Marking guide / answer	04.01	<p>a)</p> <p>i) Any <b>two</b>: easily formed, easily welded, strength or any other acceptable answer. ii) Any <b>one</b>: poor corrosion resistance, heavy. b) Any <b>two</b>: Complete coverage, long life, corrosion resistant, appearance or any other acceptable answer.</p>	<p>(2 marks) (1 mark)</p> <p>(2 marks)</p> <p>(Total 5)</p>
16 Marking guide / answer	04.02	<p>a) Any <b>three</b>: Strength, weight, looks, malleability, corrosion resistance or any other acceptable answer.</p> <p>b)</p>	<p>(3 marks)</p>

Question no.	Syllabus ref.	Question	Marks
		<p>i) Austenitic stainless steel (or other acceptable answer).</p> <p>ii) Any <b>three</b>: Corrosion resistance, malleability, strength, appearance (or suitable reasons to match the material selected in part i)).</p> <p>c) Any <b>three</b>: annealing, hardening, tempering, normalising.</p>	<p>(1 mark)</p> <p>(3 marks)</p> <p>(3 marks)</p> <p>(Total 10)</p>
17 Marking guide / answer	04.03	<p>a) To ensure no flats in completed cylinder.</p> <p>b) Either sketch acceptable.</p> <div style="text-align: center;"> <p>Pyramid rollers      Pinch rollers</p> </div> <p>c) Hammering over a former, pressing, box and pan folder, press brake or any other suitable description.</p>	<p>(1 mark)</p> <p>(2 marks)</p> <p>(2 marks)</p> <p>(Total 5)</p>
18 Marking guide / answer	04.03	$BA = 0.01745 \times R \times \theta$ $= 0.01745 \times 46.5 \times 180 = 146.05 + 120 \text{ (flats)}$ $= \mathbf{266.05 \text{ (accept 266)}}$	<p>(3 marks correct workings)</p> <p>(2 marks correct answer)</p> <p>(Total 5)</p>
<b>Total marks</b>			<b>100</b>