

## Instruction Sheet for the Candidate

<b>Qualification</b>	<b>National Vocational Certificate in Metal Forming &amp; Processing Level 4</b>
<b>Competency Standards</b>	<ul style="list-style-type: none"> <li>• CS 32 Manage the meetings</li> <li>• CS 33 Manage workforce planning</li> <li>• CS 34 Undertake project work</li> <li>• CS 35 Identify and communicate trends in career development</li> <li>• CS 36 Apply interpersonal skills</li> <li>• CS 37 Work safely in an office environment</li> <li>• CS 38 Maintain professionalism in workplace</li> <li>• CS 39 Perform Lathe Machine and Shaper Operations</li> <li>• CS 40 Perform Milling and Hobbing Operations</li> <li>• CS 41 Perform Shielded Metal Arc Welding (SMAW)</li> <li>• CS 42 Perform Submerged Arc Welding (SAW)</li> <li>• CS 43 Perform Metal Die Casting Operations</li> <li>• CS 44 Perform Centrifugal Casting Process</li> <li>• CS 45 Perform Shell Mold Casting</li> <li>• CS 46 Perform Investment Casting</li> <li>• CS 47 Perform Die Forging Process</li> <li>• CS 48 Perform Hydrostatic Extrusion Process</li> <li>• CS 49 Perform Wire Drawing Process</li> <li>• CS 50 Perform Heat Treatment of Ferrous Materials</li> <li>• CS 51 Perform Heat Treatment of Non-Ferrous Materials</li> <li>• CS 52 Carryout Hardness Testing</li> <li>• CS 53 Carryout Impact Testing</li> <li>• CS 54 Perform Mechanical Testing on Universal Testing Machine</li> <li>• CS 55 Perform Torsion Test and Fatigue test</li> </ul>
<b>Purpose of Assessment</b>	<b>Summative Assessment</b>
<b>Candidate Details</b>	Name_____ Registration/Roll Number_____
<b>Guidance for Candidate</b>	<p><b>To meet this standard, you are required to complete one of the following as given by the assessor, within 04 Hrs. time frame (for practical demonstration &amp; assessment):</b></p> <ul style="list-style-type: none"> <li>• Prepare Welds on Carbon Steel Plate, overhead (4F) and Overhead (4G), by using SMAW.</li> <li>• Perform wire drawing through draw plate.</li> <li>• Perform precision / flash less forging operation</li> <li>• Perform investment casting as per given instruction</li> </ul>

<p><b>Time: 04 Hrs.</b></p>	<p>During a practical assessment, under observation by an assessor, you are required to</p> <ul style="list-style-type: none"> <li>• Prepare Welds on Carbon Steel Plate, overhead (4F) and Overhead (4G), by using SMAW.</li> <li>• Perform wire drawing through draw plate.</li> <li>• Perform precision / flash less forging operation</li> <li>• Carry out hobbing operation to make a gear</li> <li>• Perform investment casting as per given instruction</li> </ul>
<p><b>Minimum Evidence Required</b></p>	<p><b>Prepare Welds on Carbon Steel Plate, overhead (4F) and Overhead (4G), by using SMAW.</b></p> <ol style="list-style-type: none"> <li>1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings</li> <li>2. Carry out the pre cleaning of base metal as per requirement.</li> <li>3. Prepare SMAW welding machine in accordance with welding procedure specifications/ manufacturer instructions</li> <li>4. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer's instructions</li> <li>5. Connect welding machine to an independent power supply</li> <li>6. Set polarity indicated in the welding procedure specifications</li> <li>7. Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirements to produce acceptable weld</li> <li>8. Maintain distance between electrode and base metal as per standard practices</li> <li>9. Carry out welding in Overhead (4F) and Overhead (4G) positions following standard procedures</li> <li>10. Check root, filling and capping passes for any visual discontinuities as per acceptance standards</li> <li>11. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects</li> <li>12. Carry out finishing work of welds following standard procedures</li> </ol>

	<p>13. Clean work area in accordance with workplace safety practices</p> <p>14. Maintain and store tools/equipment/consumable materials in accordance with organization guidelines</p> <p><b>Perform wire drawing through draw plate.</b></p> <ol style="list-style-type: none"> <li>1. Select the required tools and equipment for wire drawing</li> <li>2. Arrange raw material wire for process as per drawing</li> <li>3. Perform heat treatment of the raw material wire in the heating furnace as per material requirement</li> <li>4. Install the draw plate as per standard</li> <li>5. Taper the proper length of the wire to be drawn and lubricate it</li> <li>6. Select a hole in the draw plate slightly smaller than the diameter of raw material wire</li> <li>7. Pull the wire through the plate</li> <li>8. Maintain the constant speed to ensure the uniformity</li> <li>9. Repeat the process with successively smaller holes until the desired diameter is achieved</li> </ol> <p><b>Perform precision / flash less forging operation</b></p> <ol style="list-style-type: none"> <li>1. Select the tools and Equipment required for the given task.</li> <li>2. Calculate the material volume based on task requirements.</li> <li>3. Use tools and formers according to the standard operating procedure.</li> <li>4. Setup the forging machine in accordance with the Standard Operating Procedure and specifications.</li> <li>5. Operate the forging machine in accordance with the Standard Operating Procedure</li> <li>6. Carryout pre-forming / Edging operation as per requirement</li> <li>7. Safe Operating Procedure should be followed.</li> <li>8. Check the forging to ensure conformance to tolerances and specifications.</li> <li>9. Measure all dimensions using proper measuring tools</li> <li>10. Carryout inspection for forging defects.</li> </ol> <p><b>Carry out hobbing operation to make a gear.</b></p>
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	<ol style="list-style-type: none"> <li>1. Select the material, type, shape and size of cutter according to the job requirements</li> <li>2. Arrange measuring tools, cutting tools and holding devices</li> <li>3. Clamp the gear blank and hob cutter into their holding devices as per the standard practice</li> <li>4. Maintain safe distance between gear blank and hob cutter as per prescribed method</li> <li>5. Adjust the revolution per minute of hob cutter and table according to the specifications of work piece</li> <li>6. Produce simple/angled/differential indexing and divide the gear into required number of divisions</li> <li>7. Check the hob cutter and the gear blank that both are positioned properly and adjust them, if required</li> <li>8. Operate Hobbing machine according to given specifications and ensure all the parameters of the gear are met using relevant instruments</li> <li>9. Check and confirm the measurements with given specifications and finalize the gear by removing defects or shortcomings</li> </ol> <p><b>Perform investment casting as per given instruction</b></p> <ol style="list-style-type: none"> <li>1. Arrange wax patterns as per requirement</li> <li>2. Use cores to form any internal features within the pattern if required</li> <li>3. Attach patterns to a central wax gating system (sprue, runners, and risers) to form a tree-like assembly</li> <li>4. Place wax tree-like assembly into mold flask</li> <li>5. Prepare slurry by mixing ceramic powder with water and stir it homogenously</li> <li>6. Perform degassing of slurry in vacuum chamber</li> <li>7. Pour slurry into the flask to coat the wax pattern tree</li> <li>8. Bake the shell as per standard to form a ceramic shell around the patterns and gating system</li> <li>9. Remove the wax leaving a hollow ceramic shell that acts as a one-piece mold</li> <li>10. Apply protective coating to mold as per standard</li> <li>11. Pre-heat mold in a furnace as per SOP</li> </ol>
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	<p>12. Pour molten metal from a ladle into the gating system of the mold</p> <p>13. Carry out complete filling of the mold cavity with liquid melt as per standard operating procedure</p> <p>14. Allow adequate solidification time to form final casting</p> <p>15. Remove casting flask as per standard procedure</p> <p>16. Separate the parts from the gating system by either sawing or cold breaking (using liquid nitrogen)</p> <p>17. Clean up work area and equipment and dispose of waste according to environmental requirements</p>
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## Self-Assessment Checklist

<b>Candidate Name</b>		
<b>Registration No.</b>		
<b>Qualification</b>	<b>National Vocational Certificate in Metal Forming &amp; Processing Level 4</b>	
<b>Competency Standards</b>	<ul style="list-style-type: none"> <li>• CS 32 Manage the meetings</li> <li>• CS 33 Manage workforce planning</li> <li>• CS 34 Undertake project work</li> <li>• CS 35 Identify and communicate trends in career development</li> <li>• CS 36 Apply interpersonal skills</li> <li>• CS 37 Work safely in an office environment</li> <li>• CS 38 Maintain professionalism in workplace</li> <li>• CS 39 Perform Lathe Machine and Shaper Operations</li> <li>• CS 40 Perform Milling and Hobbing Operations</li> <li>• CS 41 Perform Shielded Metal Arc Welding (SMAW)</li> <li>• CS 42 Perform Submerged Arc Welding (SAW)</li> <li>• CS 43 Perform Metal Die Casting Operations</li> <li>• CS 44 Perform Centrifugal Casting Process</li> <li>• CS 45 Perform Shell Mold Casting</li> <li>• CS 46 Perform Investment Casting</li> <li>• CS 47 Perform Die Forging Process</li> <li>• CS 48 Perform Hydrostatic Extrusion Process</li> <li>• CS 49 Perform Wire Drawing Process</li> <li>• CS 50 Perform Heat Treatment of Ferrous Materials</li> <li>• CS 51 Perform Heat Treatment of Non-Ferrous Materials</li> <li>• CS 52 Carryout Hardness Testing</li> <li>• CS 53 Carryout Impact Testing</li> <li>• CS 54 Perform Mechanical Testing on Universal Testing Machine</li> <li>• CS 55 Perform Torsion Test and Fatigue test</li> </ul>	
<b>Purpose of Assessment</b>	<b>Summative Assessment</b>	
<b>Assessment Task</b>	<ul style="list-style-type: none"> <li>• Prepare Welds on Carbon Steel Plate, overhead (4F) and Overhead (4G), by using SMAW.</li> <li>• Perform wire drawing through draw plate.</li> <li>• Perform precision / flash less forging operation</li> <li>• Perform investment casting as per given instruction</li> </ul>	

I can.....

Performance Criteria	Yes	No
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1. Identify welding requirements from the job, welding procedure specifications and/or technical drawings	<input type="checkbox"/>	<input type="checkbox"/>
2. Carry out the pre cleaning of base metal as per requirement.	<input type="checkbox"/>	<input type="checkbox"/>
3. Prepare SMAW welding machine in accordance with welding procedure specifications/ manufacturer instructions	<input type="checkbox"/>	<input type="checkbox"/>
4. Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer's instructions	<input type="checkbox"/>	<input type="checkbox"/>
5. Connect welding machine to an independent power supply	<input type="checkbox"/>	<input type="checkbox"/>
6. Set polarity indicated in the welding procedure specifications	<input type="checkbox"/>	<input type="checkbox"/>
7. Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirements to produce acceptable weld	<input type="checkbox"/>	<input type="checkbox"/>
8. Maintain distance between electrode and base metal as per standard practices	<input type="checkbox"/>	<input type="checkbox"/>
9. Carry out welding in Overhead (4F) and Overhead (4G) positions following standard procedures	<input type="checkbox"/>	<input type="checkbox"/>
10. Check root, filling and capping passes for any visual discontinuities as per acceptance standards	<input type="checkbox"/>	<input type="checkbox"/>
11. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects	<input type="checkbox"/>	<input type="checkbox"/>
12. Carry out finishing work of welds following standard procedures	<input type="checkbox"/>	<input type="checkbox"/>
13. Clean work area in accordance with workplace safety practices	<input type="checkbox"/>	<input type="checkbox"/>
14. Maintain and store tools/equipment/consumable materials in accordance with organization guidelines	<input type="checkbox"/>	<input type="checkbox"/>
15. Select the required tools and equipment for wire drawing	<input type="checkbox"/>	<input type="checkbox"/>
16. Arrange raw material wire for process as per drawing	<input type="checkbox"/>	<input type="checkbox"/>
17. Perform heat treatment of the raw material wire in the heating furnace as per material requirement	<input type="checkbox"/>	<input type="checkbox"/>
18. Install the draw plate as per standard	<input type="checkbox"/>	<input type="checkbox"/>
19. Taper the proper length of the wire to be drawn and lubricate it	<input type="checkbox"/>	<input type="checkbox"/>
20. Select a hole in the draw plate slightly smaller than the diameter of raw material wire	<input type="checkbox"/>	<input type="checkbox"/>
21. Pull the wire through the plate	<input type="checkbox"/>	<input type="checkbox"/>
22. Maintain the constant speed to ensure the uniformity	<input type="checkbox"/>	<input type="checkbox"/>
23. Repeat the process with successively smaller holes until the desired diameter is achieved	<input type="checkbox"/>	<input type="checkbox"/>
24. Select the tools and Equipment required for the given task.	<input type="checkbox"/>	<input type="checkbox"/>
25. Calculate the material volume based on task requirements.	<input type="checkbox"/>	<input type="checkbox"/>

26. Use tools and formers according to the standard operating procedure.	<input type="checkbox"/>	<input type="checkbox"/>
27. Setup the forging machine in accordance with the Standard Operating Procedure and specifications.	<input type="checkbox"/>	<input type="checkbox"/>
28. Operate the forging machine in accordance with the Standard Operating Procedure	<input type="checkbox"/>	<input type="checkbox"/>
29. Carryout pre-forming / Edging operation as per requirement	<input type="checkbox"/>	<input type="checkbox"/>
30. Safe Operating Procedure should be followed.	<input type="checkbox"/>	<input type="checkbox"/>
31. Check the forging to ensure conformance to tolerances and specifications.	<input type="checkbox"/>	<input type="checkbox"/>
32. Measure all dimensions using proper measuring tools	<input type="checkbox"/>	<input type="checkbox"/>
33. Carryout inspection for forging defects.	<input type="checkbox"/>	<input type="checkbox"/>
34. Select the material, type, shape and size of cutter according to the job requirements	<input type="checkbox"/>	<input type="checkbox"/>
35. Arrange measuring tools, cutting tools and holding devices	<input type="checkbox"/>	<input type="checkbox"/>
36. Clamp the gear blank and hob cutter into their holding devices as per the standard practice	<input type="checkbox"/>	<input type="checkbox"/>
37. Maintain safe distance between gear blank and hob cutter as per prescribed method	<input type="checkbox"/>	<input type="checkbox"/>
38. Adjust the revolution per minute of hob cutter and table according to the specifications of work piece	<input type="checkbox"/>	<input type="checkbox"/>
39. Produce simple/angled/differential indexing and divide the gear into required number of divisions	<input type="checkbox"/>	<input type="checkbox"/>
40. Check the hob cutter and the gear blank that both are positioned properly and adjust them, if required	<input type="checkbox"/>	<input type="checkbox"/>
41. Operate Hobbing machine according to given specifications and ensure all the parameters of the gear are met using relevant instruments	<input type="checkbox"/>	<input type="checkbox"/>
42. Check and confirm the measurements with given specifications and finalize the gear by removing defects or shortcomings	<input type="checkbox"/>	<input type="checkbox"/>
43. Arrange wax patterns as per requirement	<input type="checkbox"/>	<input type="checkbox"/>
44. Use cores to form any internal features within the pattern if required	<input type="checkbox"/>	<input type="checkbox"/>
45. Attach patterns to a central wax gating system (sprue, runners, and risers) to form a tree-like assembly	<input type="checkbox"/>	<input type="checkbox"/>
46. Place wax tree-like assembly into mold flask	<input type="checkbox"/>	<input type="checkbox"/>
47. Prepare slurry by mixing ceramic powder with water and stir it homogenously	<input type="checkbox"/>	<input type="checkbox"/>
48. Perform degassing of slurry in vacuum chamber	<input type="checkbox"/>	<input type="checkbox"/>
49. Pour slurry into the flask to coat the wax pattern tree	<input type="checkbox"/>	<input type="checkbox"/>
50. Bake the shell as per standard to form a ceramic shell around the patterns and gating system	<input type="checkbox"/>	<input type="checkbox"/>
51. Remove the wax leaving a hollow ceramic shell that acts as a	<input type="checkbox"/>	<input type="checkbox"/>



one-piece mold		
52. Apply protective coating to mold as per standard	<input type="checkbox"/>	<input type="checkbox"/>
53. Pre-heat mold in a furnace as per SOP	<input type="checkbox"/>	<input type="checkbox"/>
54. Pour molten metal from a ladle into the gating system of the mold	<input type="checkbox"/>	<input type="checkbox"/>
55. Carry out complete filling of the mold cavity with liquid melt as per standard operating procedure	<input type="checkbox"/>	<input type="checkbox"/>
56. Allow adequate solidification time to form final casting	<input type="checkbox"/>	<input type="checkbox"/>
57. Remove casting flask as per standard procedure	<input type="checkbox"/>	<input type="checkbox"/>
58. Separate the parts from the gating system by either sawing or cold breaking (using liquid nitrogen)	<input type="checkbox"/>	<input type="checkbox"/>
59. Clean up work area and equipment and dispose of waste according to environmental requirements	<input type="checkbox"/>	<input type="checkbox"/>

Candidate's Signature\_\_\_\_\_ Assessor's Signature\_\_\_\_\_

Date: \_\_\_\_\_

## Assessors Judgment Guide

<b>Qualification</b>	<b>National Vocational Certificate in Metal Forming &amp; Processing Level 4</b>
<b>Competency Standards</b>	<ul style="list-style-type: none"> <li>CS 32 Manage the meetings</li> <li>CS 33 Manage workforce planning</li> <li>CS 34 Undertake project work</li> <li>CS 35 Identify and communicate trends in career development</li> <li>CS 36 Apply interpersonal skills</li> <li>CS 37 Work safely in an office environment</li> <li>CS 38 Maintain professionalism in workplace</li> <li>CS 39 Perform Lathe Machine and Shaper Operations</li> <li>CS 40 Perform Milling and Hobbing Operations</li> <li>CS 41 Perform Shielded Metal Arc Welding (SMAW)</li> <li>CS 42 Perform Submerged Arc Welding (SAW)</li> <li>CS 43 Perform Metal Die Casting Operations</li> <li>CS 44 Perform Centrifugal Casting Process</li> <li>CS 45 Perform Shell Mold Casting</li> <li>CS 46 Perform Investment Casting</li> <li>CS 47 Perform Die Forging Process</li> <li>CS 48 Perform Hydrostatic Extrusion Process</li> <li>CS 49 Perform Wire Drawing Process</li> <li>CS 50 Perform Heat Treatment of Ferrous Materials</li> <li>CS 51 Perform Heat Treatment of Non-Ferrous Materials</li> <li>CS 52 Carryout Hardness Testing</li> <li>CS 53 Carryout Impact Testing</li> <li>CS 54 Perform Mechanical Testing on Universal Testing Machine</li> <li>CS 55 Perform Torsion Test and Fatigue test</li> </ul>
<b>Purpose of Assessment</b>	<b>Summative Assessment</b>
<b>Candidate Details</b>	Name: _____ Registration/Roll Number: _____ Signature: _____
<b>Assessment Outcome</b>	<div style="display: flex; justify-content: space-between; align-items: center;"> <span><b>COMPETENT</b> <input type="checkbox"/></span> <span><b>NOT YET COMPETENT</b> <input type="checkbox"/></span> </div> Name of the Assessor _____ Assessor's code: _____ Signature: _____

Assessment Summary (to be filled by the assessor)		
Activity	Method	Result

Nature of Activity	Written	Oral	Observation	Portfolio	Role Play	Competent	Not Yet Competent
Practical Skill Demonstration			✓				
Knowledge Assessment		✓					
Other Requirement							

## Observation Checklist

<b>Assessment Task</b>	<ul style="list-style-type: none"><li>• Prepare Welds on Carbon Steel Plate, overhead (4F) and Overhead (4G), by using SMAW.</li><li>• Perform wire drawing through draw plate.</li><li>• Perform precision / flash less forging operation</li><li>• Perform investment casting as per given instruction</li></ul>			
<b>During the practical assessment, candidate demonstrated the following:</b>		<b>Yes</b>	<b>No</b>	<b>Remarks</b>
1.	Identify welding requirements from the job, welding procedure specifications and/or technical drawings			
2.	Carry out the pre cleaning of base metal as per requirement.			
3.	Prepare SMAW welding machine in accordance with welding procedure specifications/ manufacturer instructions			
4.	Set up welding machine accessories and consumables as per job requirements, welding procedure specifications and/or manufacturer's instructions			
5.	Connect welding machine to an independent power supply			
6.	Set polarity indicated in the welding procedure specifications			
7.	Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirements to produce acceptable weld			
8.	Maintain distance between electrode and base metal as per standard practices			
9.	Carry out welding in Overhead (4F) and Overhead (4G) positions following standard procedures			
10.	Check root, filling and capping passes for any visual discontinuities as per acceptance standards			
11.	Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects			

12.	Carry out finishing work of welds following standard procedures			
13.	Clean work area in accordance with workplace safety practices			
14.	Maintain and store tools/equipment/consumable materials in accordance with organization guidelines			
15.	Select the required tools and equipment for wire drawing			
16.	Arrange raw material wire for process as per drawing			
17.	Perform heat treatment of the raw material wire in the heating furnace as per material requirement			
18.	Install the draw plate as per standard			
19.	Taper the proper length of the wire to be drawn and lubricate it			
20.	Select a hole in the draw plate slightly smaller than the diameter of raw material wire			
21.	Pull the wire through the plate			
22.	Maintain the constant speed to ensure the uniformity			
23.	Repeat the process with successively smaller holes until the desired diameter is achieved			
24.	Select the tools and Equipment required for the given task.			
25.	Calculate the material volume based on task requirements.			
26.	Use tools and formers according to the standard operating procedure.			
27.	Setup the forging machine in accordance with the Standard Operating Procedure and specifications.			
28.	Operate the forging machine in accordance with the Standard Operating Procedure			
29.	Carryout pre-forming / Edging operation as per requirement			
30.	Safe Operating Procedure should be followed.			
31.	Check the forging to ensure conformance to tolerances and specifications.			

32.	Measure all dimensions using proper measuring tools			
33.	Carryout inspection for forging defects.			
34.	Select the material, type, shape and size of cutter according to the job requirements			
35.	Arrange measuring tools, cutting tools and holding devices			
36.	Clamp the gear blank and hob cutter into their holding devices as per the standard practice			
37.	Maintain safe distance between gear blank and hob cutter as per prescribed method			
38.	Adjust the revolution per minute of hob cutter and table according to the specifications of work piece			
39.	Produce simple/angled/differential indexing and divide the gear into required number of divisions			
40.	Check the hob cutter and the gear blank that both are positioned properly and adjust them, if required			
41.	Operate Hobbing machine according to given specifications and ensure all the parameters of the gear are met using relevant instruments			
42.	Check and confirm the measurements with given specifications and finalize the gear by removing defects or shortcomings			
43.	Arrange wax patterns as per requirement			
44.	Use cores to form any internal features within the pattern if required			
45.	Attach patterns to a central wax gating system (sprue, runners, and risers) to form a tree-like assembly			
46.	Place wax tree-like assembly into mold flask			
47.	Prepare slurry by mixing ceramic powder with water and stir it homogenously			
48.	Perform degassing of slurry in vacuum chamber			
49.	Pour slurry into the flask to coat the wax pattern tree			
50.	Bake the shell as per standard to form a ceramic shell around the patterns and gating system			

51.	Remove the wax leaving a hollow ceramic shell that acts as a one-piece mold			
52.	Apply protective coating to mold as per standard			
53.	Pre-heat mold in a furnace as per SOP			
54.	Pour molten metal from a ladle into the gating system of the mold			
55.	Carry out complete filling of the mold cavity with liquid melt as per standard operating procedure			
56.	Allow adequate solidification time to form final casting			
57.	Remove casting flask as per standard procedure			
58.	Separate the parts from the gating system by either sawing or cold breaking (using liquid nitrogen)			
59.	Clean up work area and equipment and dispose of waste according to environmental requirements			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

## Knowledge Assessment

<b>Qualification</b>	<b>National Vocational Certificate in Metal Forming &amp; Processing Level 4</b>
<b>Competency Standards</b>	<ul style="list-style-type: none"> <li>CS 32 Manage the meetings</li> <li>CS 33 Manage workforce planning</li> <li>CS 34 Undertake project work</li> <li>CS 35 Identify and communicate trends in career development</li> <li>CS 36 Apply interpersonal skills</li> <li>CS 37 Work safely in an office environment</li> <li>CS 38 Maintain professionalism in workplace</li> <li>CS 39 Perform Lathe Machine and Shaper Operations</li> <li>CS 40 Perform Milling and Hobbing Operations</li> <li>CS 41 Perform Shielded Metal Arc Welding (SMAW)</li> <li>CS 42 Perform Submerged Arc Welding (SAW)</li> <li>CS 43 Perform Metal Die Casting Operations</li> <li>CS 44 Perform Centrifugal Casting Process</li> <li>CS 45 Perform Shell Mold Casting</li> <li>CS 46 Perform Investment Casting</li> <li>CS 47 Perform Die Forging Process</li> <li>CS 48 Perform Hydrostatic Extrusion Process</li> <li>CS 49 Perform Wire Drawing Process</li> <li>CS 50 Perform Heat Treatment of Ferrous Materials</li> <li>CS 51 Perform Heat Treatment of Non-Ferrous Materials</li> <li>CS 52 Carryout Hardness Testing</li> <li>CS 53 Carryout Impact Testing</li> <li>CS 54 Perform Mechanical Testing on Universal Testing Machine</li> <li>CS 55 Perform Torsion Test and Fatigue test</li> </ul>
<b>Purpose of Assessment</b>	<b>Summative Assessment</b>
<b>Candidate Details</b>	Name: _____ Registration/Roll Number: _____ Candidate Signature: _____
<b>Assessment Outcome</b>	<div style="display: flex; justify-content: space-around; align-items: center;"> <span><b>COMPETENT</b> <input type="checkbox"/></span> <span><b>NOT YET COMPETENT</b> <input type="checkbox"/></span> </div> Name of the Assessor: _____ Assessor's code: _____ Signature of the Assessor: _____

Candidate's response is not required to be identical, but similar concepts and/or keywords must be used. Oral questioning may be used to clarify candidate understanding of topic and its application.



<b>Questions</b> (Candidate confidently answered questions correctly and demonstrated understanding of the topics and their application)		<b>Satisfactory</b>	<b>Not Satisfactory</b>
1.	Describe the principle of Submerged Arc Welding.		
2.	What are different types of rolling mills?		
3.	What are different rolling conditions?		
4.	What is basic difference between direct and indirect extrusion process?		
5.	Enlist different types of forging processes.		
6.	What is the importance of flash in forging operation?		

7.	What are different steps of centrifugal casting process?		
8.	What is shell mold casting?		
9.	What are different advantages of shell molding process?		
10.	What are different components of a gating system?		

<b>Feedback to the Candidate</b>
<b>Candidate's Signature</b> _____ <b>Assessor's Signature</b> _____