

Assessment Evidence Guide

For

“Technician in Metallurgy and Metal casting”

Level-2

Module name

(Summative Assessment)

8th -12th March 2021



**National Vocational & Technical
Training Commission**

Title of Qualification: Technician in Metallurgy and Metal casting	CS Code:	Level: 2	Version: 01
Competency Standard Title: Construct multi-view drawings Perform Raw Material Sampling Manufacture Wooden Pattern Perform health, safety and environment practices Prepare sand mold for casting Perform Sand Casting Fettle and trim metal casting Perform surface cleaning by sand blasting	Assessment Date (DD/MM/YY): Assessment Time: 5 hours		

Candidate Details	Name: Registration/Roll Number:.....
Guidance for Candidate	<p>To meet this standard, you are required to complete the following within the given time frame (for practical demonstration & assessment): Annexure 1</p> <p>Assessment Task 1: Candidate is required to:</p> <ul style="list-style-type: none"> • Verify multi view drawing of given part <p>Assessment Task 2: Candidate is required to:</p> <ul style="list-style-type: none"> • Interpret Drawing of given Pattern • Interpret given pattern as per requirement <p>Assessment Task 3: Candidate is required to:</p> <ul style="list-style-type: none"> • Ensure personal protective equipment (PPE) <p>Assessment Task 4: Candidate is required to:</p> <ul style="list-style-type: none"> • Perform sampling of molding materials • Perform scrap sorting process <p>Assessment Task 5: Candidate is required to:</p> <ul style="list-style-type: none"> • Produce mold by hand using two piece/split pattern <p>Assessment Task 6: Candidate is required to:</p> <ul style="list-style-type: none"> • Perform sand casting process • Perform post casting operations <p>Assessment Task 7: Candidate is required to:</p> <ul style="list-style-type: none"> • Fettle excess metal from cast part <p>Assessment Task 8: Candidate is required to:</p> <ul style="list-style-type: none"> • Perform surface cleaning <p>And complete:</p> <ol style="list-style-type: none"> 1. Knowledge assessment test (Written or Oral) 2. Portfolios at the time of assessment (if any)

Minimum Evidence Required	<p>During a practical assessment, under observation by an assessor, you will complete:</p> <p>Performance Criteria</p> <ol style="list-style-type: none"> 1. Prepare Drawing sheet then divide it in equal parts. 2. Draw Boundaries lines as per standards and make title bar 3. Draw plan, front and side views of simple bearing 4. Interpret the Pattern drawing 5. Recognize basics of lines & Identify manufacturing requirements 6. Assemble parts of pattern 7. Mark material and develop construction as per specifications 8. Produce pattern components according to size and shape 9. For permanent joint use glue, nails & temporary joints use dowel pins 10. Assemble the pattern symmetrically 11. Arrange and wear PPEs as per job requirement 12. Collect random samples for testing then sort various molding materials (silica sand, molasses, sodium silicate, mold coating and Co₂ gas) 13. Place pattern on molding platform, place drag part of mold and then ram molding sand by rammer. 14. Roll over the drag part and strike off extra green sand. 15. Place other half of the pattern (with dowel) and match it 16. Place pouring basin, runner and gate at appropriate place 17. Create a parting line by pouring parting sand on drag part. 18. Place cope part and sprue pin on runner. 19. Add riddled molding sand and ram using rammer then remove extra sand using strike off bar 20. Make vents for gas escaping with vent wire at appropriate place. 21. Remove cope part and make pouring gate with gate cutter. 22. Make cavity by drawing out pattern halves politely. 23. Place cope with locating plug, position the ladle in line with molds 24. Tilt the ladle to pour un-interrupted molten melt into the molds 25. Maintain down sprue level during pouring as per SOPs 26. Ensure metal stream inoculation for each mold 27. Shake out casting from molds, inspect final metal casting as prescribed in work order 28. Perform visual inspection to identify excess material for removal
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	<p>process and perform chipping, fettling, wedge cutting etc.</p> <p>29. Fettle excess metal (runners, risers and flashing) as per standard operating procedures.</p> <p>30. Verify the required specification after fettling process of excess metal</p> <p>31. Record and report the casting defects as per SOPs.</p> <p>32. Set air pressure and place sample in chamber</p> <p>33. Operate blasting equipment in accordance with standard operating procedures then remove and clean specimen</p> <p>34. Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirement to produce acceptable weld</p> <p>35. Carry out welding as per given metal properties.</p> <p>36. Deposit root passes, filling passes and capping passes as per welding procedure specifications/job requirements</p> <p>37. Check root, filling and capping passes for any visual discontinuities as per acceptance standards</p> <p>38. Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects</p>
	<p>Portfolios required at the time of assessment (if any) for</p>

Continued on following page

Assessors Judgment Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Candidate Details	Name: Registration/Roll Number: Candidate Signature:
Assessment Outcome	COMPETENT <input type="checkbox"/> NOT YET COMPETENT <input type="checkbox"/> Name of the Assessor: Assessor's code: Signature of the Assessor:

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							

Each Assessment Task (with performance criteria)				
Assessment Task 1		Description of assessment task 1		
During the practical assessment, candidate demonstrated the following:		Yes	No	Remarks
1.	Prepare Drawing sheet then divide it in equal parts.			
2.	Draw Boundaries lines as per standards and make title bar			
3.	Draw plan, front and side views of simple bearing			
4.	Interpret the Pattern drawing			
5.	Recognize basics of lines & Identify manufacturing requirements			
6.	Assemble parts of pattern			
7.	Mark material and develop construction as per specifications			
8.	Produce pattern components according to size and shape			
9.	For permanent joint use glue, nails & temporary joints use dowel pins			
10.	Assemble the pattern symmetrically			
11.	Arrange and wear PPEs as per job requirement			
12.	Collect random samples for testing then sort various molding materials (silica sand, molasses, sodium silicate, mold coating and Co2 gas)			
13.	Prepare report for record keeping and circulate to concerned department			
14.	Place pattern on molding platform, place drag part of mold and then ram molding sand by rammer.			
15.	Roll over drag part and strike off extra green sand.			
16.	Place other half of pattern(with dowel) & match it			

17.	Place pouring basin, runner and gate at appropriate place			
18.	Create a parting line by pouring parting sand on drag part.			
19.	Place cope part and sprue pin on runner.			
20.	Add riddled molding sand and ram using rammer then remove extra sand using strike off bar			
21.	Make vents for gas escaping with vent wire at appropriate place.			
22.	Remove cope part and make pouring gate with gate cutter.			
23.	Make cavity by drawing out pattern halves politely.			
24.	Place cope with locating plug, position the ladle in line with molds			
25.	Tilt the ladle to pour un-interrupted molten melt into the molds			
26.	Maintain down sprue level during pouring as per SOPs			
27.	Ensure metal stream inoculation for each mold			
28.	Shake out casting from molds, inspect final metal casting as prescribed in work order			
29.	Perform visual inspection to identify excess material for removal process and perform chipping, fettling, wedge cutting etc.			
30.	Fettle excess metal (runners, risers and flashing) as per standard operating procedures.			
31.	Verify the required specification after fettling process of excess metal			
32.	Record and report the casting defects as per SOPs.			
33.	Set air pressure and place sample in chamber			

34.	Operate blasting equipment in accordance with standard operating procedures then remove and clean specimen			
35.	Adjust welding parameters (current, voltage etc.) as per welding procedure specifications/job requirement to produce acceptable weld			
36.	Carry out welding as per given metal properties.			
37.	Deposit root passes, filling passes and capping passes as per welding procedure specifications/job requirements			
38.	Check root, filling and capping passes for any visual discontinuities as per acceptance standards			
39.	Follow applicable manufacturing codes and standards for acceptance criteria of visual welding defects			
Competent <input type="checkbox"/>		Not Yet Competent <input type="checkbox"/>		

Title of Qualification: Technician in Metallurgy and Metal casting	CS Code:	Level:2	Version: 01
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Guidance for Candidate	To complete your assessment for this Competency Standard, you need to answer the questions on the following pages successfully.
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Assessors Guide (to be completed by the Assessor and signed both by the assessor and the candidate after the assessment)

Candidate Details	Name:.....Registration/Roll Number: Candidate Signature:
Written Assessment Outcome	COMPETENT <input type="checkbox"/> NOT YET COMPETENT <input type="checkbox"/> Name of the Assessor:Assessor's code: Signature of the Assessor:.....

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WRITTEN ASSESSMENT

Question	Candidate's answer
1. Describe purpose of slotter, planner and shaper machine.	<ul style="list-style-type: none"> Slotter is a machine tool for shaping vertical surfaces with a cutting tool held in a vertically reciprocating ram Shaper is Machine tool which produces flat surfaces in horizontal, vertical or inclined planes depending upon the orientation of the cutting tool Planner machine is used for machining the edges of heavy work pieces.
2. What are different types of raw material?	<ul style="list-style-type: none"> Common casting metals are aluminum, magnesium, and copper alloys. Other materials include tin, zinc, and lead alloys and iron and steel are also cast in graphite molds.
3. What is pattern and why is it used?	<ul style="list-style-type: none"> In casting, a pattern is a replica of the object to be cast, used to prepare the cavity into which molten material will be poured during the casting process.
4. From which material patterns are made of?	<ul style="list-style-type: none"> Patterns used in sand casting may be made of wood, metal, plastics or other materials.
5. Why plaster of Paris is used in making master dies and molds?	<ul style="list-style-type: none"> Plaster of Paris is usually used in making master dies and molds, as it gains hardness quickly, with a lot of flexibility when in the setting stage.

Question	Candidate's answer
6. Explain the steps of sand casting.	<p>Following are steps in this process:</p> <ul style="list-style-type: none"> • Place a pattern in sand to create a mold. • Incorporate the pattern and sand in a gating system. • Remove the pattern. • Fill the mold cavity with molten metal. • Allow the metal to cool. • Break away the sand mold and remove the casting.
7. Define collapsibility and permeability.	<ul style="list-style-type: none"> • Collapsibility — This is the ability of the sand to be easily stripped off the casting after it has solidified. Sands with poor collapsibility will adhere strongly to the casting. • Permeability — This refers to the sand's ability to exhaust gases. This is important because during the pouring process many gases are produced, such as hydrogen, nitrogen, carbon dioxide, and steam, which must leave the mold otherwise casting defects, such as blow holes and gas holes, occur in the casting.
8. Name different kinds of Sands used in metal casting.	<ul style="list-style-type: none"> • Silica Sand • Olivine Sand • Chromite Sand • Zircon Sand • Chamotte Sand
9. What are binders, why they are used. Name few binders used in casting.	<ul style="list-style-type: none"> • Binders are added to a base sand to bond the sand particles together (i.e. it is the glue that holds the mold together). <p>NAMES OF FEW BINDERS</p> <ul style="list-style-type: none"> • Oil • Resin • Sodium Silicate
10. What are additives and parting compound.	<ul style="list-style-type: none"> • Additives are added to the molding components to improve: surface finish, dry strength, refractoriness, and "cushioning properties". • To get the pattern out of the mold, prior to casting, a parting compound is applied to the pattern to ease removal. They can be a liquid or a fine powder