



QUALIFICATION FILE – Micro Credentials

Application of AI (Metal Sector)

☒ Public ☐ Private

☒ Upskilling ☐ Dual/Flexi Qualification ☐ For ToT ☐ For ToA

☐ General ☐ Multi-skill (MS) ☐ Cross Sectoral (CS) ☒ Future Skills ☐ OEM

NCrF/NSQF Level: 5

Submitted By:

Indian Iron and Steel Sector Skill Council (IISSC)

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Section 1: Basic Details

1.	Micro Credential-Qualification Name	Application of AI (Metal Sector)		
2.	Sector/s	Iron & Steel		
3.	National Qualification Register (NQR) Code & Version (Will be issued after NSQC approval.)	NM-05-IS-04237-2025-V1-IISSSC	4. NCrF/NSQF Level: 5	
5.	Brief Description of the Micro Credential	This micro credential provides a comprehensive overview of artificial intelligence tailored for the steel industry. Covering fundamental concepts in AI, it delves into deep learning specifically for steel applications, explores integration with automation and robotics, advances AI techniques pertinent to steel manufacturing, and emphasizes AI's role in decision-making and automation within steel production processes.		
6.	Eligibility Criteria for Entry for Students/Trainee/Learner/Employee	a. Entry Qualification & Relevant Experience		
		S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)
		1.	12 th Pass or equivalent	no experience
		2.	12th pass with 2-year NTC/NAC in relevant trade	1 year of experience in relevant field
		3.	3 year Diploma in Metallurgy / Mechanical / Electrical / Production	2 years of experience in relevant field
7.	Credits Assigned to this Qualification, Subject to Assessment (as per National Credit Framework (NCrF))	b. Age 18		
		1	8. Common Cost Norm Category (I/II/III) (wherever applicable): I	
9.	Any Licensing Requirements/ Pre-requisites for Undertaking Training (wherever applicable)	No Licensing		
10.	Expected Outcomes of the Micro Credential	Terminal learning outcomes are:		

		• Demonstrate a comprehensive understanding of different types of AI, including Machine Learning, Deep Learning, Reinforcement Learning, and their applications in steel production and industrial contexts. • Compare the benefits and limitations of AI with traditional methods in steel production to assess the potential impact and feasibility of AI adoption in improving efficiency, productivity, and decision-making processes. • Develop problem-solving skills to troubleshoot potential challenges associated with implementing AI models in a steel production environment, including issues related to data quality, model performance, and integration with existing systems. • Design decision support systems that integrate AI models for process control and production optimization in steel manufacturing, and explore the potential of AI technologies to enable autonomous robots and automation in steel production environments.												
11.	Training Duration by Modes of Training Delivery <i>(Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)</i>	☒ Offline Only ☐ Online Only ☐ Blended <table><tr><th>Training Delivery Mode</th><th>Theory (Hours)</th><th>Practical (Hours)</th><th>Total (Hours)</th></tr><tr><td>Classroom (offline)</td><td>20</td><td>10</td><td>30</td></tr><tr><td>Online</td><td>0</td><td>0</td><td>0</td></tr></table> <i>(Refer Blended Learning Annexure for Details)</i>	Training Delivery Mode	Theory (Hours)	Practical (Hours)	Total (Hours)	Classroom (offline)	20	10	30	Online	0	0	0
Training Delivery Mode	Theory (Hours)	Practical (Hours)	Total (Hours)											
Classroom (offline)	20	10	30											
Online	0	0	0											
12.	Assessment Criteria	<table><tr><th>Theory (Marks)</th><th>Practical (Marks)</th><th>Project (Marks)</th><th>Viva (Marks)</th><th>Total (Marks)</th><th>Passing %age</th></tr><tr><td>40</td><td>60</td><td>0</td><td>0</td><td>100</td><td>70</td></tr></table>	Theory (Marks)	Practical (Marks)	Project (Marks)	Viva (Marks)	Total (Marks)	Passing %age	40	60	0	0	100	70
Theory (Marks)	Practical (Marks)	Project (Marks)	Viva (Marks)	Total (Marks)	Passing %age									
40	60	0	0	100	70									
13.	Is the Qualification Amenable to Persons with Disability	☒ Yes ☐ No If “Yes”, <i>specify applicable type of Disability</i>: Partial hearing disability Candidate should be able to communicate properly with/without aids.												
14.	How participation of women will be encouraged?	Equal employment opportunity is being given in the industry.												

15.	Other Indian Languages in which the Micro Credential will be implemented.	English only and Vernacular language	
16.	Is similar Micro Credential Qualification(s) available on NQR-if yes, justification for this qualification	☐ Yes ☒ No URLs of similar Qualifications:	
17.	Name and Contact Details Submitting / Awarding Body SPOC	Name: Mr. Sushim Banerjee Email: ceo@iisssc.org/ sushim_banerjee@yahoo.com Contact No.: 033-23247559 Website: https://www.iisssc.org/	
18.	Final Approval Date by NSQC: 08.05.2025	19. Validity Duration: 3 Years	20. Next Review Date: 08.05.2028

Section 2: Training Related

1.	Trainer's Qualification and experience in relevant sector (in years) (as per requirement and NCVET guidelines)	ITI (Computer Science/IT and other relevant domains) in the relevant discipline with minimum 3 years of experience in their professional fields (including minimum 2 years of relevant industry experience) Or Diploma (Computer Science/IT and other relevant domains) in the relevant discipline with minimum 2 years of experience in their professional fields (including minimum 2 years of relevant industry experience) Or BE/BTECH or higher (Computer Science/IT and other relevant domains) with minimum 2 years of experience in their professional fields with 1 year of relevant industry experience
2.	Master Trainer's Qualification and experience in relevant sector (in years) (as per requirement and NCVET guidelines)	B.Tech (Computer Science/IT and other relevant domains) with 6 years of industry and 2 years of training experience in metal casting
3.	Tools and Equipment Required for Training	☒ Yes ☐ No (If "Yes", details to be provided in Annexure)

Section 3: Assessment Related

1.	Assessor's Qualification and experience in relevant sector (in years) <i>(as per requirement and NCVET guidelines)</i>	ITI (Computer Science/IT and other relevant domains) in the relevant discipline with minimum 4 years of experience in their professional fields with 2 years of relevant industry experience. Or Diploma (Computer Science/IT and other relevant domains) in the relevant discipline with minimum 3 years of experience in their professional fields with 2 years of relevant industry experience Or BE/BTECH or higher (Computer Science/IT and other relevant domains) with minimum 3 years of experience in their professional fields with 1 year of relevant industry experience
2.	Proctor's Qualification and experience in relevant sector (in years) <i>(as per requirement and NCVET guidelines)</i>	B.Tech (Computer Science/IT and other relevant domains) with 5 years of industry and 2 years of assessment experience in metal casting
3.	Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years) <i>(as per requirement and NCVET guidelines)</i>	Diploma in the relevant discipline with a minimum of 10 years of experience in their professional fields with 3 years of relevant industry experience Or BE/BTECH or higher with minimum 7 years of experience in their professional fields with 5 year of relevant industry experience
4.	Assessment Mode <i>(Specify the assessment mode)</i>	Mode: ☐ Online Only ☒ Offline Only ☐ Blended
5.	Tools and Equipment Required for Assessment	☒ Same as for training ☐ Yes ☐ No <i>(details to be provided in Annexure-if it is different for Assessment)</i>

Section 4: Evidence of Need of the Micro Credential

As per the NCVET Guidelines for evidence of need, provide the required Annexure/Supporting documents.

1.	Government /Industry initiatives/ requirement (Yes/No): Yes
2.	Number of Industry validation provided: 5
3.	Estimated number of people to be trained: 1000

Section 5: Annexure Check List

Specify Annexure Number and Name.

1.	Annexure: NCrf/NSQF level justification based on NCrf Level/NSQF descriptors <i>(Mandatory)</i>	Attached
2.	Annexure: Learning Outcomes and Assessment Criteria <i>(Mandatory)</i>	Attached
3.	Annexure: Assessment Strategy <i>(Mandatory)</i>	Attached
4.	Annexure: List of tools and equipment relevant for qualification <i>(Mandatory – Except in case of online course)</i>	Attached
5.	Annexure: Blended Learning <i>(Mandatory in case selected mode of delivery is “Blended Learning”)</i>	Attached
6.	Annexure: Acronym and Glossary <i>(Optional)</i>	Attached

Annexure: Evidence of Level

NCrF/NSQF Level Descriptors	Key requirements of the job role/ outcome of the qualification	How the job role/ outcomes relate to the NCrF/NSQF level descriptor	NCrF/NSQF Level
Professional Theoretical Knowledge/Process	- Integration of AI in Steel Quality Assurance Processes - Advanced Application of AI Algorithms for Predictive Maintenance - Optimization of Production Processes through Advanced AI Techniques	At NSQF Level 5, Professional Theoretical Knowledge/Process in AI for steel plants involves an advanced understanding of AI principles and their specific application in steel manufacturing. Professionals are expected to possess in-depth theoretical knowledge and expertise in AI algorithms, models, and techniques, enabling them to innovate and optimize steel production processes effectively.	5
Professional and Technical Skills/ Expertise/ Professional Knowledge	- Advanced proficiency in AI concepts and techniques tailored for steel manufacturing. - Expertise in implementing deep learning models for optimizing steel production processes. - Ability to integrate AI with automation and robotics systems in steel plants. - In-depth knowledge of advanced AI techniques relevant to steel industry challenges. - Skill in leveraging AI for data-driven decision-making and automation within steel manufacturing.	At NSQF Level 5, Professional and Technical Skills/Expertise/Professional Knowledge for AI in steel plants entail advanced proficiency in AI algorithms, deep learning techniques, and automation integration. This level requires individuals to possess in-depth understanding and application of AI methodologies to optimize steel manufacturing processes, demonstrating high-level problem-solving and decision-making capabilities.	5
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	- Ability to quickly learn and adapt to new technologies and methodologies in AI for steel plants. - Proficiency in identifying and solving complex challenges encountered in AI implementation within steel manufacturing processes. - Aptitude for working collaboratively with multidisciplinary teams to integrate AI	At NSQF Level 5, Employment Readiness & Entrepreneurship Skills & Mindset/Professional Skills in AI for steel plants involve preparing individuals to lead AI initiatives. They develop competencies in project management, innovation, and strategic thinking, enabling them to drive AI implementation in steel production, fostering a	5

	technologies effectively into steel plant workflows.	culture of innovation and entrepreneurship within the organization.	
Broad Learning Outcomes/Core Skill	- Advanced understanding of AI principles and methodologies. - Proficiency in implementing deep learning techniques tailored for steel industry applications. - Ability to integrate AI technologies with automation and robotics systems in steel manufacturing processes. - Expertise in employing advanced AI techniques to optimize steel production efficiency and quality. - Skill in leveraging AI for informed decision-making and automation in steel plant operations.	The Broad Learning Outcomes/Core Skills for the NSQF Level 5 job role in AI for steel plants include advanced proficiency in AI concepts, deep learning applications, automation and robotics integration, and decision-making automation. These outcomes align with NSQF Level descriptors by demanding expert knowledge and skills application in complex, specialized contexts within steel manufacturing.	5
Responsibility	- Lead the implementation of AI solutions to optimize steel production processes. - Develop and deploy advanced AI models tailored for steel industry challenges. - Collaborate with cross-functional teams to integrate AI technologies with existing systems. - Ensure compliance with industry standards and regulations in AI applications. - Continuously evaluate and improve AI algorithms to enhance steel manufacturing efficiency. - Provide training and mentorship on AI techniques to junior staff members.	At NSQF Level 5, the Responsibility for AI in steel plants entails overseeing complex AI applications, ensuring alignment with NSQF level descriptors. Professionals at this level are accountable for implementing sophisticated AI solutions to optimize steel manufacturing processes, enhance efficiency, and drive innovation, reflecting the advanced competencies expected at this level.	5

Annexure: Learning Outcomes and Assessment Criteria

Detailed learning outcomes and assessment criteria for the qualification are as follows:

S. No.	Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC 1.	Write basic Python code modeling steel production processes.	0	3	0	0
PC 2.	Develop Python scripts for cleaning and preprocessing sensor data in steel manufacturing.	0	3	0	0
PC 3.	Analyze data using Pandas to derive statistics and visualize trends relevant to steel production.	1	3	0	0
PC 4.	Execute Python programs for industry-specific calculations like alloy compositions and yield strength estimations.	1	3	0	0
PC 5.	Automate tasks such as data extraction and visualization in steel quality control.	1	2	0	0
PC 6.	Assess AI's advantages and limitations compared to traditional methods in steel production.	1	3	0	0
PC 7.	Identify AI use cases for predictive maintenance, quality control, and supply chain management in steel plants.	1	3	0	0
PC 8.	Formulate proposals for integrating AI into existing Industry 4.0 initiatives or creating new ones for steel production.	1	2	0	0
PC 9.	Evaluate AI's feasibility and impact on steel production, considering technological readiness and organizational capabilities.	3	3	0	0
PC 10.	Propose AI integration strategies aligned with strategic objectives and operational needs in the steel industry.	5	3	0	0
PC 11.	Implement Convolutional Neural Networks (CNNs) for defect detection in steel products.	3	2	0	0
PC 12.	Utilize explainability methods to enhance transparency in deep learning models for steel production.	3	2	0	0
PC 13.	Analyze sensor data and steel images to preprocess inputs for deep learning models.	5	3	0	0
PC 14.	Interpret outputs of deep learning models for defect detection and optimization in steel manufacturing.	2	3	0	0
PC 15.	Experiment with model architectures and optimization algorithms for optimal performance in steel tasks.	2	3	0	0
PC 16.	Employ deep learning for synthetic data generation to address data scarcity in steel production.	1	3	0	0
PC 17.	Evaluate AI's potential for automation in steel plants to improve resource utilization and waste reduction.	1	3	0	0
PC 18.	Optimize robotic workflows using AI techniques like reinforcement learning in steel production.	3	2	0	0

PC 19.	Interpret results from AI models deployed for defect detection and process optimization in steel plants.	3	3	0	0
PC 20.	Troubleshoot challenges related to AI implementation in steel production, such as data quality and integration issues.	1	3	0	0
PC 21.	Devise strategies to overcome technical obstacles and ensure seamless AI deployment in steel manufacturing.	1	3	0	0
PC 22.	Design and conduct experiments to assess the effectiveness of AI solutions for steel production challenges.	1	2	0	0
Total Marks		40	60	0	0

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Annexure: Assessment Strategy

This section includes the processes involved in identifying, gathering, and interpreting information to evaluate the Candidate on the required competencies of the program.

Mention the detailed assessment strategy in the provided template.

1. Assessment System Overview:

- Batches assigned to the assessment agencies for conducting the assessment on SDMS/SIP or email
- Assessment agencies send the assessment confirmation to VTP/TC looping SSC
- Assessment agency deploys the ToA certified Assessor for executing the assessment
- SSC monitors the assessment process & records

2. Testing Environment:

- Confirm that the centre is available at the same address as mentioned on SDMS or SIP
- Check the duration of the training.
- Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
- Metal Casting the batch size is more than 30, then there should be 2 Assessors.
- Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
- Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
- Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
- Check the availability of the Lab Equipment for the particular Job Role.

3. Assessment Quality Assurance levels / Framework:

- Question papers created by the Subject Matter Experts (SME)
- Question papers created by the SME verified by the other subject Matter Experts
- Questions are mapped with NOS and PC
- Question papers are prepared considering that level 1 to 3 is for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
- Assessor must be ToA certified & trainer must be ToT Certified
- Assessment agency must follow the assessment guidelines to conduct the assessment

4. Types of evidence or evidence-gathering protocol:

- Time-stamped & geotagged reporting of the assessor from assessment location

- Centre photographs with signboards and scheme specific branding
- Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
- Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos

5. Method of verification or validation:

- Surprise visit to the assessment location
- Random audit of the batch
- Random audit of any candidate

6. Method for assessment documentation, archiving, and access

- Hard copies of the documents are stored
- Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage
- Soft copies of the documents & photographs of the assessment are stored in the Hard Drives

Annexure: Tools and Equipment

List of Tools and Equipment

Batch Size: 30

S. No.	Tool / Equipment Name	Specification	Quantity for specified Batch size
1	Python	As per requirement	30
2	3D printer	As per requirement	5
4	Safety Glove	As per requirement	30
5	Laptop	As per requirement	30
6	Projector	As per requirement	1
7	Whiteboard	As per requirement	1

Classroom Aids:

The aids required to conduct sessions in the classroom are:

1. Whiteboard and marker
2. Projector
3. Laptop
4. Internet

Annexure: Industry Validations Summary

S. No	Organization Name	Representative Name	Designation	Contact Address	Contact Phone No	E-mail ID	LinkedIn Profile (if available)
1	ArcelorMittal Nippon Steel India Ltd.	Mr. Prakash Hegde	DGM	27 th km, Surat-Hazira Rd., Hazira, Surat 394270, Gujarat	9909901396	Prakash.hegde@amns.in	
2	IPS Contractors & Labour Suppliers	Mr. Tosif Shaikh	IPS Contractors	Pithampur Disst. Dhar (MP) 454775	9907590590	hr.ipscontractors@gmail.com	
3	Tata Steel Mining Ltd.	Mr. Ajay Kumar Singh	AGM-HR	Bhubaneswar, Odisha – 751015	9234511004	a.singh@tatasteelmining.com	
4	Tata Steel Ltd	Mr. Padmapal	Chief of Blast Furnaces	Mumbai	9234567561	Padma.pal@tatasteel.com	
5	Rourkela Steel Plant	H. Pati	GM	Rourkela - 769011	8895500593		

Annexure: Training Details

Training Projections:

Year	Estimated Training # of Total Candidates	Estimated training # of Women	Estimated training # of People with Disability
2024-25	500	200	50
2025-26	1000	400	100
2026-27	1500	600	150

Data to be provided year-wise for next 3 years.

Annexure: Blended Learning

Blended Learning Estimated Ratio & Recommended Tools:

Refer NCVET “Guidelines for Blended Learning for Vocational Education, Training & Skilling” available on:

<https://ncvet.gov.in/sites/default/files/Guidelines%20for%20Blended%20Learning%20for%20Vocational%20Education,%20Training%20&%20Skilling.pdf>

S. No.	Select the Components of the Qualification	List Recommended Tools – for all Selected Components	Offline: Online Ratio
1	☒ Theory/ Lectures - Imparting theoretical and conceptual knowledge	• Books/ e-books • Presentations • Reference Material • Audio / Video Modules	
2	☒ Imparting Soft Skills, Life Skills and Employability Skills /Mentorship to Learners	• Self-Learning Videos • Broadcasts • Mobile Learning • Curated Digital content	
3	☒ Showing Practical Demonstrations to the learners	• Video Content • E-Resource library • AR/VR/XR	
4	☒ Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training	• Training tools (tools list attached) • Video Play • Presentations	
5	☒ Tutorials/ Assignments/ Drill/ Practice	• Online Question Bank • Mobile Quick test app • MCQ based tests	

6	☒ Proctored Monitoring/ Assessment/ Evaluation/ Examinations	• Assessment engine for Essays • Up-loadable file examinations • Mock test sessions	
7	☒ On the Job Training (OJT)/ Project Work Internship	• Online tests • Offline assessments	

Annexure: Acronym and Glossary

Acronym

Acronym	Description
AA	Assessment Agency
AB	Awarding Body
ISCO	International Standard Classification of Occupations
NCO	National Classification of Occupations
NCrF	National Credit Framework
NQR	National Qualification Register
NSQF	National Skills Qualifications Framework
OJT	On the Job Training
CAD/CAM	Computer-aided design and computer-aided manufacturing
CAE	Computer-aided engineering

Glossary

Term	Description
Qualification	A formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards
Qualification File	A Qualification File is a template designed to capture necessary information of a Qualification from the perspective of NSQF compliance. The Qualification File will be normally submitted by the awarding body for the qualification.
Sector	A grouping of professional activities based on their main economic function, product, service or technology.