QUALIFICATION FILE

Applications of AI in Construction Safety

☒ Horizontal / Generic ☐ Vertical/Specialization

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

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

NCrF/NSQF Level: 3

Submitted By:

Integrated Council for Entrepreneurship and Skilling (ICES)

Address: 301-303, Suncity Trade Tower, Sector-21, Gurugram, Haryana-122016

Submitting Body Contact Details:

Name: Maya Thakur

Position in the Organization: Chief Executive Officer (CEO)

Address: Same as above

Tel number(s): +91 9717900050

E-mail address: ceo@iceskills.in

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Section 1: Basic Details

<table>
<tr><td>1.</td><td>NOS-Qualification Name</td><td colspan="2">Applications of AI in Construction Safety</td></tr>
<tr><td>2.</td><td>Sector/s</td><td colspan="2">Construction</td></tr>
<tr><td>3.</td><td>Type of Qualification:
☒ New ☐ Revised</td><td>NQR Code & version of existing/previous qualification:
NA (change to previous, once approved)</td><td>Qualification Name of existing/previous version: NA</td></tr>
<tr><td>4.</td><td>National Qualification Register (NQR) Code & Version
(Will be issued after NSQC approval)</td><td>NG-03-CO-046452025-V1-ICES & Version 1.0</td><td>5. NCrF/NSQFLevel: 3</td></tr>
<tr><td>6.</td><td>Brief Description of the Qualification</td><td colspan="2">This NOS specifies the skills and competencies required to apply artificial intelligence (AI) technologies to support safety management in construction environments. The individual is responsible for monitoring AI-enabled systems, interpreting risk predictions, validating alerts, reporting anomalies and ensuring coordinated communication on potential hazards. Application responsibilities include the safe use of AI-driven sensors, surveillance platforms, predictive maintenance tools, VR/AR workplace simulations and automated audit dashboards. Emphasis is on accurate risk interpretation, compliance support, emergency preparedness, structured incident reporting and contributing to decision-making alongside safety engineers and supervisors.</td></tr>
<tr><td>7.</td><td>Eligibility Criteria for Entry for Student / Trainee / Learner / Employee</td><td colspan="2">a. Entry Qualification & Relevant Experience:
<table>
<tr><th>S. No.</th><th>Academic/Skill Qualification (with Specialization - if applicable)</th><th>Required Experience (with Specialization - if applicable)</th></tr>
<tr><td>1.</td><td>10th Grade Pass</td><td></td></tr>
<tr><td>2.</td><td>8th Grade Pass</td><td>3-years of Relevant Industry Experience</td></tr>
<tr><td>3.</td><td>Previous relevant Qualification of NSQF Level 2</td><td>3 years of Relevant Industry Experience</td></tr>
</table></td></tr>
</table>

<table>
<tr><td></td><td></td><td colspan="3"><table><tr><td>4.</td><td>Previous relevant Qualification of NSQF Level 2.5</td><td>1.5 years of Relevant Industry Experience</td></tr></table>b. Age: As per Govt. Norms</td></tr>
<tr><td>8.</td><td>Credits Assigned to this Qualification, Subject to Assessment (as per National Credit Framework (NCrF))</td><td>2</td><td colspan="2">9. Common Cost Norm Category (I/II/III) (wherever applicable): I</td></tr>
<tr><td>10.</td><td>Any Licensing requirements for Undertaking Training on This Qualification (wherever applicable)</td><td colspan="3">Not Applicable</td></tr>
<tr><td>11.</td><td>Training Duration by Modes of Training Delivery (Specify Total Duration as per selected training delivery modes and as per requirement of the qualification)</td><td colspan="3">☐ Offline ☒ Online ☐ Blended
<table><tr><th>Training Delivery Modes</th><th>Theory (Hours)</th><th>Practical (Hours)</th><th>OJT Mandatory (Hours)</th><th>OJT Recommended (Hours)</th><th>Total (Hours)</th></tr><tr><td>Classroom (offline)</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Online</td><td>40</td><td>20</td><td></td><td></td><td>60</td></tr></table>(Refer Blended Learning Annexure for details)</td></tr>
<tr><td>12.</td><td>Assessment Criteria</td><td colspan="3"><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>30</td><td>60</td><td></td><td>10</td><td>100</td><td>50</td></tr></table></td></tr>
<tr><td>13.</td><td>Is the Job Role Amenable to Persons with Disability</td><td colspan="3">☐ Yes ☒ No
If “Yes”, specify applicable type of Disability:</td></tr>
<tr><td>14.</td><td>Progression path after attaining the qualification (Please show Professional and Academic progression)</td><td colspan="3">Construction Safety Technician (NSQF Level: 4)</td></tr>
<tr><td>15.</td><td>How Participation of Women will be Encouraged</td><td colspan="3">By advocating the following aspects, participation of women will be encouraged.
• Equal Access & Reservation Support</td></tr>
</table>

		• Promotion of AI-Based Safety Roles for Women • Safe and Conducive Learning & Training Environment • Flexible Training Hours & Localised Centres • Awareness Outreach and Counselling • Digital Enablement Over Physical-Labour Roles • Scholarships and Fee Reduction Opportunities • Career Progression Support	
16.	**Other Indian languages in which the Qualification & Model Curriculum are being submitted**	Hindi	
17.	**Is similar NOS available on NQR-if yes, justification for this qualification**	☐ Yes ☒ No URLs of similar Qualifications:	
18.	**Name and Contact Details of Submitting / Awarding Body SPOC** *(In case of CS or MS, provide details of both Lead AB & Supporting ABs)*	**Name:** Maya Thakur **Email:** ceo@iceskills.in **Contact No.:** +91 9717900050 **Website:** www.iceskills.in	
19.	**Final Approval Date by NSQC:** *07-10-2025*	20. **Validity Duration:** 3 Years	21. **Next Review Date:** *07-10-2028*

Section 2: Training Related

<table>
<tr><td rowspan="6">1.</td><td rowspan="6">Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)</td><td rowspan="2">Minimum Educational Qualification</td><td rowspan="2">Specialization</td><td colspan="2">Relevant Industry Experience</td><td colspan="2">Preferable Training Experience</td></tr>
<tr><td>Years</td><td>Specialization</td><td>Years</td><td>Specialization</td></tr>
<tr><td>Post Graduation</td><td>Civil / CSE & IT Engineering</td><td>1</td><td></td><td>1</td><td></td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>Graduation</td><td>Civil / CSE & IT Engineering</td><td>3</td><td></td><td>1</td><td></td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>Diploma</td><td>Civil / CSE & IT Engineering</td><td>5</td><td></td><td>1</td><td></td></tr>
<tr><td rowspan="6">2.</td><td rowspan="6">Master Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)</td><td rowspan="2">Minimum Educational Qualification</td><td rowspan="2">Specialization</td><td colspan="2">Relevant Industry Experience</td><td colspan="2">Preferable Training Experience</td></tr>
<tr><td>Years</td><td>Specialization</td><td>Years</td><td>Specialization</td></tr>
<tr><td>Post Graduation</td><td>Civil / CSE & IT Engineering</td><td>2</td><td></td><td>1</td><td></td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>Graduation</td><td>Civil / CSE & IT Engineering</td><td>4</td><td></td><td>1</td><td></td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>Diploma</td><td>Civil / CSE & IT Engineering</td><td>6</td><td></td><td>1</td><td></td></tr>
<tr><td>3.</td><td>Tools and Equipment Required for Training</td><td colspan="6">☒ Yes ☐ No (If "Yes", details provided in Annexure)</td></tr>
<tr><td>4.</td><td>In Case of Revised NOS, Details of Any Upskilling Required for Trainer</td><td colspan="6">Not Applicable</td></tr>
</table>

Section 3: Assessment Related

<table>
<tr><td rowspan="5">1.</td><td rowspan="5">Assessor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines</td><td>Minimum Educational Qualification</td><td>Specialization</td><td colspan="2">Relevant Industry Experience</td><td colspan="2">Preferable Training/Assessment Experience</td></tr>
<tr><td></td><td></td><td>Years</td><td>Specialization</td><td>Years</td><td>Specialization</td></tr>
<tr><td>Post Graduation</td><td>Civil / CSE & IT Engineering</td><td>1</td><td></td><td>1</td><td></td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>Graduation</td><td>Civil / CSE & IT Engineering</td><td>3</td><td></td><td>1</td><td></td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="5">2.</td><td rowspan="5">Proctor's Qualification and experience in relevant sector (in years) (as per NCVET guidelines)</td><td>Diploma</td><td>Civil / CSE & IT Engineering</td><td>5</td><td></td><td>1</td><td></td></tr>
<tr><td>Minimum Educational Qualification</td><td>Specialization</td><td colspan="4">Relevant Technical Experience</td></tr>
<tr><td></td><td></td><td colspan="2">Years</td><td colspan="2">Specialization</td></tr>
<tr><td>Graduation</td><td>Any Stream</td><td colspan="2">1</td><td colspan="2">in basic computer skills, documentation, coordination etc.</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td>Diploma</td><td>In any stream</td><td colspan="2">2</td><td colspan="2">in basic computer skills, documentation, coordination etc.</td></tr>
</table>

3.	**Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	**Minimum Educational Qualification**	**Specialization**	**Relevant Industry Experience**		**Preferable Training/Assessment Experience**	
				Years	**Specialization**	**Years**	**Specialization**
		Post Graduation	Civil / CSE & IT Engineering	10		2	
		OR					
		Graduation	Civil / CSE & IT Engineering	10		2	
4.	**Assessment Mode** (Specify the assessment mode)	Offline					
5.	**Tools and Equipment Required for Assessment**	☒ Same as for training ☐ Yes ☐ No *(details to be provided in Annexure-if it is different for Assessment)*					

Section 4: Evidence of the need for Qualification

Provide Annexure/Supporting documents name.

1.	**Government /Industry initiatives/ requirement (Yes/No):**	Yes
2.	**Number of Industry validations provided:**	7
3.	**Estimated nos. of people to be trained:**	2,100
4.	**Evidence of Concurrence/Consultation with Line/State Departments (In case of regulated sectors): (Yes/No):** If "No", why:	Yes

Section 5: Annexure & Supporting Documents Check List

Specify Annexure Name / Supporting document file name:

1.	**Annexure:** NCrF/NSQF level justification based on NCrF level/NSQF descriptors *(Mandatory)*	Yes
2.	**Annexure:** List of tools and equipment relevant for qualification *(Mandatory, except in case of online course)*	Yes
3.	**Annexure:** Performance and Assessment Criteria *(Mandatory)*	Yes
4.	**Annexure:** Assessment Strategy *(Mandatory)*	Yes

5.	**Annexure:** Blended Learning *(Mandatory, in case selected Mode of delivery is "Blended Learning")*	No
6.	**Annexure:** Acronym and Glossary *(Optional)*	Yes
7.	**Annexure/Supporting Document: Standalone NOS**- Performance Criteria Details Annexure/Document with PC-wise detailing as per NOS format (Mandatory- Public view)	Yes
8.	**Supporting Document:** Model Curriculum (Mandatory – Public view)	Yes

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	Possesses knowledge involving a defined range of standard procedures employed in routine contexts. Understands the basic concept of timely delivery and Quality. Can interpret the available information and communicate the same. Basic knowledge of collecting and organizing information for problem identification and solution. Understands the basic financial and uses limited discretion and judgement over a range of known responses to familiar problems. Range of knowledge involving a defined range of standard procedures, uses limited discretion and judgement over a range of known responses to familiar problems	Understand to focus on advanced technical skills, decision-making, and application of AI tools in dynamic construction environments. Understand problem-solving, process optimization, and integration of theoretical knowledge into practical safety solutions. Reflects the ability to manage complex tasks, collaborate in teams, and contribute to improving safety standards in alignment with industry benchmarks. Demonstrates proficiency in using cutting-edge technologies to address real-world challenges, a key requirement for higher NSQF levels. Ensure learners can adapt to evolving technological advancements in construction safety, meeting the innovation-focused expectations of NCrF/NSQF frameworks.	3
Professional and Technical Skills/ Expertise/ Professional Knowledge	A range of skills and technical capabilities of carrying out a choice of processes and procedures within the range of familiar contexts. The ability to gain, and where relevant apply a range of knowledge, skills and understanding. Has the required skills for Identification of the problem and	Reflects advanced technical skills, problem-solving abilities, and application of AI tools in complex construction environments. Focus on Innovation and Technology Adoption: Demonstrates proficiency in leveraging cutting-edge AI	3

	issues within the range of familiar contexts and generate possible solution. Skills to identify the relevant tools and materials in given context. Possesses operational knowledge and understanding of the work/ job. Skill to deliver job/work with reasonable precision. Range of technical skills Required skills for Identification of the problem and issues within the range of familiar contexts	technologies to address real-world safety challenges, aligning with higher NSQF levels. Decision-Making and Leadership: Highlights the ability to make informed decisions, manage safety protocols, and lead teams in implementing AI-driven solutions. Process Optimization and Risk Management: Emphasizes the integration of theoretical knowledge into practical outcomes, such as predictive maintenance and real-time monitoring. Adaptability to Industry Standards: Ensures learners meet regulatory compliance requirements and contribute to improving safety benchmarks in alignment with NCrF/NSQF frameworks. Continuous Learning and Upskilling: Encourages staying updated with evolving AI technologies, ensuring lifelong learning and professional growth as per NSQF guidelines.	
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	Working as a member of a team/ within a team. Display Personal Motivation. Positive Attitude and Passion for Work, Good skills in written and oral communication with some clarity, basic knowledge of Language to support such communication. Intermediate literacy and Numeracy skills, Skills for workshop calculations and basic of arithmetic and algebraic principles. Have broader Employability Skills including self-employment and mini entrepreneurship skills creating jobs for more than 1 person. Can use digital tools, have basic Financial and Digital literacy, Aadhar and Mobile, digital payments etc. with some proficiency. Basic understanding of social, political, natural and work environment. Basic understanding of Constitutional values and Citizenship, inclusion and Diversity	Reflects advanced technical and professional skills, emphasizing employment readiness through hands-on application of AI technologies. Focus on Employability Skills: Ensures learners are equipped with critical thinking, teamwork, and communication skills required for higher-level roles in construction safety. Entrepreneurial Alignment: Encourages learners to explore entrepreneurial opportunities by leveraging AI tools to create innovative safety solutions, aligning with NSQF 's focus on self-employment. Industry-Relevant Outcomes: Prepares learners to meet the demands of modern construction	3

	Team readiness and Entrepreneurial readiness Team worker, with broad employability skills who displays of motivation and positive attitude for work.	safety roles, ensuring they contribute to improving safety standards and operational efficiency. Continuous Improvement Mindset: Promotes lifelong learning and adaptability, enabling learners to stay updated with evolving AI technologies and industry trends. Leadership and Responsibility: Highlights the ability to take ownership of safety protocols, manage risks, and lead teams, aligning with higher NSQF levels ' expectations for leadership and accountability.	
Broad Learning Outcomes/Core Skill	The candidate must be able to carry out job/ work/ tasks/ /small project/assignments in a familiar, predictable, routine, situation of clear choice. Focus on range of applications of standard procedures or operations in production/ services. Able to identify/ anticipate the problems and possible range of solutions in production/ services, Tasks are mostly performed by own and require little instructions and supervision. Understands all safety and general hygiene norms and environmental aspects, together with Risks. For self-help group members, mini entrepreneurs end to end clear understanding of production process, quality parameters, delivery and local marketing. Carry out Range of tasks and may provide range of solutions. The candidate carries out a job in familiar, predictable, routine, situation of clear choice, can focus on range of application of standard procedures or operations in production/ services. Must be able to identify/ anticipate the problems and possible range of solutions	Understand professional skills, emphasizing the application of AI tools in complex construction environments. Demonstrates the ability to leverage AI technologies to address real-world safety challenges, aligning with higher NSQF levels. Highlights the ability to make informed decisions, manage safety protocols, and lead teams in implementing AI-driven solutions. Understand emphasizes the integration of theoretical knowledge into practical outcomes, such as predictive maintenance and real-time monitoring. Understand to ensure learners meet regulatory compliance requirements and contribute to improving safety benchmarks in alignment with NCrF/NSQF frameworks. Understand learning and Upskilling encourages staying updated with evolving AI technologies, ensuring lifelong learning and professional growth as per NSQF guidelines. Employability and Entrepreneurship: Prepares learners for	3

		both employment and entrepreneurial opportunities by equipping them with skills to innovate and implement AI-driven safety solutions.	
Responsibility	Take responsibility for delivery and quality of own work and tangible output. At Level 2.5 the candidate is a Junior Technician. At level 3.0 the candidate works as a skilled worker/ technician. Take work from the helpers or assistants and collaboratively work with junior technician. Able to assist in the planning of the routine and predictable tasks within a specific field. Accountable/ responsible Jr. Technician and Technician takes responsibility for delivery and quality of own work and tangible output. Can assist in the planning of the routine and predictable tasks within a specific field.	Understand AI-powered systems for real-time hazard detection, structural monitoring and environmental compliance. Hands-On Expertise with open-Source Models and understand customizing pre-built AI models (e.g., TensorFlow Lite, YOLO) for specific safety applications. Understand automating incident documentation and analyzing trends to prevent future safety breaches. Ability to collaborative Decision-Making: Skills in working with cross-functional teams to implement AI-driven safety protocols and ensure accountability. The listed job responsibilities are suitable for an NSQF level 3.0 job role.	3

Annexure: Tools and Equipment (Lab Set-Up)

List of Tools and Equipment

Batch Size: 30 Candidates

S. No.	Tool / Equipment Name	Specification	Units	Quantity for specified Batch size	Remarks
1.	Relevant Videos featuring AI Application in Construction Safety		Nos	1	Module Specific Videos will be shown during training of candidates

Classroom Aids

The aids required to conduct sessions in the classroom are:

1. Laptops
2. Whiteboards and markers
3. Projector
4. Screen
5. Chart paper
6. Stationery

Annexure: Industry Validations Summary

Provide the summary information of all the industry validations in table. This is not required for OEM qualifications.

S. No	Organization Name	Representative Name	Designation	Contact Address	Contact Phone No	E-mail ID	LinkedIn Profile (if available)
1.	Acropolis Institute of Technology & Research	Dr. Kamal Kumar Sethi	Professor & Head, CSE Dept.	Bypass Road, Mangila Square, Indore, MP, 453771	7314730000	info@acropolis.in	
2.	GM Construction Group Company	Shailendra Rajput	Project Manager	742, Shewa Bhavan, 10th Road, Khar-West, Mumbai, Maharashtra, 400052	8869892551	contact@gmconstruction.com	
3.	Gowri Constructions	MV Sudarsanan	Chartered Engineer	Munduvadackal, Avalookkunnu, Alleppey, Alappuzha-688006, Kerala, India	08044566819	gc@gmail.com	
4.	HG Infra Engineering Ltd.	Vijendra Singh	Senior Manager, L&D	Jaipur, Rajasthan	9929003889	vijendra.singh@hginfra.com	
5.	Jitender Associates	Dr. Jitender Muningum	Proprietor	Plot No. A-175, Phase-2, Allwyn Colony, Kukatpally,Hyderabad, Telangana	9849297759	jitemdermuningum@gmail.com	
6.	Kamrup Constructions	Deepjyali Barmin	Associate	Survey, Beltola, Guwahati-28	8453097789	23idomybest23@gmail.com	
7.	Vinay Construction Power Pvt Ltd	Shailendra Rajput	Project Manager (North Region)	742, shewa bhavan 10th Road, Khar-west, Mumbai, Maharashtra, India - 400052	8869862551	contact@gmconstruction.com	

Annexure: Training & Employment Details

Training and Employment Projections:

Year	Total Candidates	Women	People with Disability
	Estimated Training #	Estimated Training #	Estimated Training #
2025-26	700	150	As per Industry Requirement
2026-27	700	150	As per Industry Requirement
2027-28	700	150	As per Industry Requirement

Data to be provided year-wise for next 3 years

Training, Assessment, Certification and Placement Data for previous versions of Qualifications:

Qualification Version	Year	Total Candidates				Women				People with Disability			
		Trained	Assessed	Certified	Placed	Trained	Assessed	Certified	Placed	Trained	Assessed	Certified	Placed
NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Applicable for revised qualifications only, data to be provided year-wise for past 3 years.

List Schemes in which the previous version of Qualification was implemented:

1. NA

Content availability for previous versions of qualifications:

☒ Participant Handbook ☒ Facilitator Guide ☒ Digital Content ☒ Qualification Handbook ☐ Any Other:

Languages in which Content is available: English and Hindi

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 NOS	List Recommended Tools – for all selected Components	Offline: Online Ratio
1.	☐ Theory/ Lectures - Imparting theoretical and conceptualknowledge	NA	NA
2.	☐ Imparting Soft Skills, Life Skills and Employability Skills / Mentorship to Learners	NA	NA
3.	☐ Showing Practical Demonstrations to the learners	NA	NA
4.	☐ Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shopfloor training	NA	NA
5.	☐ Tutorials/ Assignments/ Drill/ Practice	NA	NA
6.	☐ Proctored Monitoring/ Assessment/ Evaluation/ Examinations	NA	NA
7.	☐ On the Job Training (OJT)/ Project Work Internship/ Candidate Training	NA	NA

Annexure: Standalone NOS- Performance Criteria details

1. Description:

This NOS specifies the skills and competencies required to apply artificial intelligence (AI) technologies to support safety management in construction environments. The individual is responsible for monitoring AI-enabled systems, interpreting risk predictions, validating alerts, reporting anomalies and ensuring coordinated communication on potential hazards. Application responsibilities include the safe use of AI-driven sensors, surveillance platforms, predictive maintenance tools, VR/AR workplace simulations and automated audit dashboards. Emphasis is on accurate risk interpretation, compliance support, emergency preparedness, structured incident reporting and contributing to decision-making alongside safety engineers and supervisors.

2. Scope:

The scope covers the following:

- Operate AI-Based Hazard Detection Systems
- Manage Smart Wearables and Worker Monitoring
- Support Structural and Equipment Monitoring Using AI
- Use AI-Based Surveillance and Incident Reporting Systems
- Apply Immersive AI Technologies for Safety Training and Emergency Drills
- Assist in AI-Supported Safety Communication, Audits and Emergency Coordination

3. Elements and Performance Criteria:

To be competent, the user/individual on the job must be able to:

Operate AI-Based Hazard Detection Systems

To be competent, the user/individual on the job must be able to:

PC 1. operate AI-enabled cameras and sensors to detect unsafe conditions, including slips, trips, falls, equipment proximity and barricade violations
PC 2. interpret hazard alerts generated from computer vision modules and confirm validity based on onsite conditions
PC 3. identify false positives and escalate suspected misclassifications to supervisors for validation
PC 4. record and communicate repeated scene-based alerts to prevent recurring risks
PC 5. verify environmental hazard warnings such as dust, noise or heat anomalies reported by AI units

Manage Smart Wearables and Worker Monitoring

To be competent, the user/individual on the job must be able to:

PC 6. configure AI-enabled wearables for fatigue, posture recording, fall prediction, health vitals and proximity alerts
PC 7. track alerts generated from wearables and correlate readings with worker behaviour or high-strain tasks.
PC 8. inform workers of unsafe fatigue signals and recommend temporary withdrawal or rest
PC 9. identify incorrect device readings or sensor disconnection issues and escalate for rectification

PC 10. maintain device logs covering alert frequency, worker ID and resolution status.
PC 11. communicate with supervisors on repeated fatigue alerts or abnormal health readings

Support Structural and Equipment Monitoring Using AI

To be competent, the user/individual on the job must be able to:

PC 12. monitor AI-enabled structural health dashboards for unusual strain, settlement or vibration patterns
PC 13. interpret predictive maintenance alerts related to cranes, hoists, scaffolds, drilling equipment or pumps
PC 14. inspect flagged areas physically to verify predicted risks and confirm severity
PC 15. support data acquisition by placing sensors at designated points as directed by supervisors
PC 16. report deviations such as loose scaffolding, anchor failure patterns or instability signals detected by AI
PC 17. coordinate with equipment technicians for maintenance actions triggered via AI prediction

Use AI-Based Surveillance and Incident Reporting Systems

To be competent, the user/individual on the job must be able to:

PC 18. review AI-based surveillance analytics for unsafe acts such as improper PPE, manual lifting, unsafe welding or crowding
PC 19. tag unsafe events recorded by smart cameras and log them for periodic safety review
PC 20. classify events by severity and category (behavioural, PPE, equipment, environmental) as per AI system outputs
PC 21. upload near-miss images or clips for digital documentation and traceability
PC 22. assist supervisors to validate automated incident reports before closure
PC 23. maintain traceability registers for alerts and event resolution timelines

Apply Immersive AI Technologies for Safety Training and Emergency Drills

To be competent, the user/individual on the job must be able to:

PC 24. operate VR/AR training modules replicating common site hazards and accident sequences
PC 25. support workers to navigate simulated emergency escape routes and rescue operations
PC 26. record participant performance data from AI-enabled simulation dashboards
PC 27. identify skill gaps observed during simulations and recommend focused re-training
PC 28. collaborate with trainers to modify simulation scenarios based on actual site hazards
PC 29. track improvements in successive simulation sessions through auto-generated analytics

Assist in AI-Supported Safety Communication, Audits and Emergency Coordination

To be competent, the user/individual on the job must be able to:

PC 30. use AI chatbots for dissemination of critical alerts and procedural safety instructions
PC 31. support the integration of AI platform alerts into the site-wide unified communication system
PC 32. assist supervisors in AI-driven safety audit documentation and compliance benchmarking
PC 33. provide data inputs for evacuation pathway planning based on AI crowd-density outputs
PC 34. maintain digital records of audit findings, corrective recommendations and timelines

PC 35. support real-time emergency response coordination using AI-generated situational maps
PC 36. escalate emergency alerts from AI dashboards to designated safety officials immediately

4. Knowledge and Understanding (KU):

The individual on the job needs to know and understand:

KU 1. construction safety regulations, risk reporting requirements and hazard classification
KU 2. procedures for incident escalation and compliance documentation
KU 3. standard emergency response protocol and first-response guidelines
KU 4. site communication channels and supervisor coordination structure
KU 5. functioning of AI-based detection modules using image analytics and sensor data
KU 6. operating architecture of IoT-enabled safety monitoring systems
KU 7. parameters monitored by smart wearables such as vitals, posture and proximity
KU 8. fundamentals of predictive maintenance outputs such as vibration, strain or anomaly trends
KU 9. features of VR/AR simulation platforms for safety orientation
KU 10. principles of automated digital reporting and AI-assisted audit dashboards
KU 11. data privacy, traceability, tagging and secure storage requirements for AI logs
KU 12. procedures for troubleshooting device connectivity, sensor failure and false alerts

5. Generic Skills (GS):

User/individual on the job needs to know how to:

GS 1. record readings, alerts, near-miss data and audit logs clearly and accurately
GS 2. interpret digital dashboards, instruction manuals and AI-generated notifications
GS 3. communicate alerts, risk interpretations and emergency instructions clearly
GS 4. apply reasoning to distinguish valid alerts from false positives
GS 5. prioritize hazards and escalate issues immediately where worker safety is involved
GS 6. work collaboratively with supervisors, technicians and training personnel
GS 7. follow time-bound tasks during audits, inspections and emergency drills

Annexure: Assessment Criteria

S. No.	Assessment Criteria for Performance Criteria	Theory Marks	Practical Marks	Project Marks	Viva Marks
Operate AI-Based Hazard Detection Systems		**5**	**10**		**1**
PC 1.	operate AI-enabled cameras and sensors to detect unsafe conditions, including slips, trips, falls, equipment proximity and barricade violations				
PC 2.	interpret hazard alerts generated from computer vision modules and confirm validity based on onsite conditions				
PC 3.	identify false positives and escalate suspected misclassifications to supervisors for validation				
PC 4.	record and communicate repeated scene-based alerts to prevent recurring risks				
PC 5.	verify environmental hazard warnings such as dust, noise or heat anomalies reported by AI units				
Manage Smart Wearables and Worker Monitoring		**5**	**10**		**1**
PC 6.	configure AI-enabled wearables for fatigue, posture recording, fall prediction, health vitals and proximity alerts				
PC 7.	track alerts generated from wearables and correlate readings with worker behaviour or high-strain tasks.				
PC 8.	inform workers of unsafe fatigue signals and recommend temporary withdrawal or rest				
PC 9.	identify incorrect device readings or sensor disconnection issues and escalate for rectification				
PC 10.	maintain device logs covering alert frequency, worker ID and resolution status.				
PC 11.	communicate with supervisors on repeated fatigue alerts or abnormal health readings				

Support Structural and Equipment Monitoring Using AI		**5**	**10**		**2**
PC 12.	monitor AI-enabled structural health dashboards for unusual strain, settlement or vibration patterns				
PC 13.	interpret predictive maintenance alerts related to cranes, hoists, scaffolds, drilling equipment or pumps				
PC 14.	inspect flagged areas physically to verify predicted risks and confirm severity				
PC 15.	support data acquisition by placing sensors at designated points as directed by supervisors				
PC 16.	report deviations such as loose scaffolding, anchor failure patterns or instability signals detected by AI				
PC 17.	coordinate with equipment technicians for maintenance actions triggered via AI prediction				
Use AI-Based Surveillance and Incident Reporting Systems		**5**	**10**		**2**
PC 18.	review AI-based surveillance analytics for unsafe acts such as improper PPE, manual lifting, unsafe welding or crowding				
PC 19.	tag unsafe events recorded by smart cameras and log them for periodic safety review				
PC 20.	classify events by severity and category (behavioural, PPE, equipment, environmental) as per AI system outputs				
PC 21.	upload near-miss images or clips for digital documentation and traceability				
PC 22.	assist supervisors to validate automated incident reports before closure				
PC 23.	maintain traceability registers for alerts and event resolution timelines				
Apply Immersive AI Technologies for Safety Training and Emergency Drills		**5**	**10**		**2**
PC 24.	operate VR/AR training modules replicating common site hazards and accident sequences				
PC 25.	support workers to navigate simulated emergency escape routes and rescue operations				
PC 26.	record participant performance data from AI-enabled simulation dashboards				
PC 27.	identify skill gaps observed during simulations and recommend focused re-training				

PC 28.	collaborate with trainers to modify simulation scenarios based on actual site hazards				
PC 29.	track improvements in successive simulation sessions through auto-generated analytics				
Assist in AI-Supported Safety Communication, Audits and Emergency Coordination		**5**	**10**		**2**
PC 30.	use AI chatbots for dissemination of critical alerts and procedural safety instructions				
PC 31.	support the integration of AI platform alerts into the site-wide unified communication system				
PC 32.	assist supervisors in AI-driven safety audit documentation and compliance benchmarking				
PC 33.	provide data inputs for evacuation pathway planning based on AI crowd-density outputs				
PC 34.	maintain digital records of audit findings, corrective recommendations and timelines				
PC 35.	support real-time emergency response coordination using AI-generated situational maps				
PC 36.	escalate emergency alerts from AI dashboards to designated safety officials immediately				
Total Marks		**30**	**60**		**10**

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.

1. **Assessment System Overview:**

   Assessment is done through ICES affiliated Assessment Agencies. Assessors are trained & certified by ICES after Training of Assessor (ToA) program. Assessments are conducted to gauge and assess the trainee's skill and knowledge competency in the specified areas.

   The assessment will have both theory, practical and viva components as per ratio specified in the Standalone NOS **Applications of AI in Construction Safety**

   During the practical task, trainees are assessed on their workmanship, quality of finished product and time management. They will be graded for all their assessments based on the approved assessment strategy which is signed off by ICES. The Assessor submits an assessment plan to ICES prior to assessments.

   The assessment plan contains the following information:

   - What will be assessed, i.e. the competency based on each NOS based on theory, practical and viva questions
   - How assessment will occur i.e. methods of assessment
   - When the assessment will occur
   - Duration of assessment
   - Where the assessment will take place i.e. context of the assessment (workplace/simulation)
   - The criteria for decision making i.e. those aspects that will guide judgments
   - Where appropriate, any supplementary criteria are used to make a judgment on the level of performance.

   ICES will be monitoring thoroughly the complete Assessment process.

2. **Testing Environment:**

   - Training partner shares the batch start date and end date, number of trainees and the job role.
   - Assessment will be fixed for a day after the end date of training. It could be next day or later. Assessment will be conducted at the training venue/test center only.
   - The knowledge/theory assessments are conducted with proper seating arrangements with enough space between the candidates to prevent mal practicing.
   - Question set for Theory and Practical will be distributed to each candidate by the Assessor.

- Theory testing will include MCQ type questions, pictorial questions etc. which will test the trainee on his theoretical knowledge of the subject.
- Practical assessments will be conducted in the approved test centers. The training provider will ensure adequate tools and materials are available to conduct the practical test.
- Viva Testing will be conducted during or post to the practical assessment by the assessor concerned. This Viva Assessment is applicable to understand the outcomes from OJT attended by the candidate concerned.

- One (1) Assessor is eligible to conduct assessments of a batch of maximum 30 candidates.
- The assessment must comprise of two components, namely:
  - Knowledge and Viva assessment (Theory assessment)
  - Skill assessment (Practical / Hands-on Skill assessment)

3. Mode of assessment

- Demonstration/Practical Performance /Skill Assessment
- Synoptic multiple-choice question test for Theory Assessment

4. Performance/skill assessment:

- The performance/skill assessment will be conducted through demonstration/practical
- For the practical test trainees are assessed through a given task, which they have to complete correctly for them to be marked as passed.
- The assessment is conducted in a simulated working environment. Due to this fact, the assessors must note that the naturally occurring evidence of competence is unavailable or infrequent. Simulation must be undertaken in a Realistic Working Environment which provides an environment that replicates the key characteristics of the workplace in which the skill to be assessed is normally employed.

5. Knowledge Assessment:

- The knowledge assessments are conducted through Theory (written) Test and Viva Test
- Synoptic test is used for this. It is an MCQ (Multiple Choice Question) test which is prepared externally and externally marked, meaning by agency having no link with training partners.
- The Viva test will be conducted by the assessor in the oral mode considering the communication and domain understanding of skills of trainees.
- The assessment strategy, weightage and duration of assessment for **Applications of AI in Construction Safety** is summarized below

Assessment Type	Formative or Summative	Strategies	Weightage	Duration (hours)
Knowledge	Summative	MCQ	30	2 hours
Knowledge	Summative	Viva	10	1 hour
Skill	Summative	Structured practical Task	60	5 hours

6. Assessment Quality Assurance levels/Framework

- ICES has developed assessment criteria framework for each Qualification pack as per National Occupational Standards. The criteria framework includes weightages/marks for each criterion under knowledge and skill. The criteria ensure quality assurance as they ensure valid, consistent and fair assessments at all locations. Issued to the affiliated Assessment body. The Assessment Body develops questions based on ICES's approved assessment criteria.
- The training partner will intimate the time of arrival of the assessor and time of leaving the venue. Random spot checks/audit may conducted by ICES to monitor assessment.
- Continuous Monitoring through virtual and In-person mode are conducted to ensure the assessment is conducted as per stipulated process
- Process and Technical audit of assessment batches by quality team are conducted to avoid errors in assessment process
- A well -defined comprehensive framework of NON-COMPLIANCE MATRIX is defined and implemented to identify the non-compliance made by assessor and AA and punitive actions are taken correspondingly.
- The capacity building sessions are conducted regularly for assessors and assessment agencies to update them about best practices in assessment

7. Types of evidence or evidence-gathering protocol:

- Evidence in the form of answer sheets in case of knowledge assessments (Theory only) is collected.
- For Practical and Viva assessments videos and photographs are prepared as evidence. These are submitted by the assessor to the assessment agency. ICES does random checks of the same with the participant/ trainee's ID and ascertains authenticity and validity of assessments.
- Post Assessment, the evidence are uploaded by Assessor to assessment agency and further assessment agency to ICES as per stipulated TAT
- Evidence are broadly photographic and video graphics in nature (Geo-Tagged)
- Results along with evidence to be submitted to ICES by the concerning Assessment Agency in the prescribed format and on Digital Format and Physical Format (As required)
- Results to be uploaded on SIDH and other relevant portals for collective data management.

8. Method of verification or validation:

- The process and technical audit of assessment batches are done by Awarding Body
- Attendance of each candidate is verified and it is ensured that only those candidates are assessed by assessors who are meeting the stipulated minimum percentage of attendance
- The result of each candidate is verified; it is verified that that result on SIP is matched with respect to summary sheet submitted by AAs
- Under detailed technical audit for sample batches, the knowledge and skill assessment results for each candidate are checked in technical aspect.
- All the evidence of batches are preserved on server of Awarding Body digital platform

9. On the Job:

- OJT is Not Applicable for this Standalone NOS.

Annexure: Acronym and Glossary

Acronym

Acronym	Description
NOS	National Occupational Standard(s)
NSQF	National Skills Qualification Framework
QP	Qualification Pack
TVET	Technical and Vocational Education and Training
MSDE	Ministry of Skill Development and Entrepreneurship
NCVET	National Council for Vocational Education and Training
NSDC	National Skill Development Corporation
ICES	Integrated Council for Entrepreneurship and Skilling (erstwhile Integrated Council for Entrepreneurship and Skilling)
AB	Awarding Body
AA	Assessment Agency
TP	Training Partner
TC	Training Centre
ITI	Industrial Training Institute
ISCO	International Standard Classification of Occupations
NCO	National Classification of Occupations
NCrF	National Credit Framework
NEP	New Education Policy
Q-File	Qualification File
MC	Model Curriculum
PC	Performance Criteria
KU	Knowledge and Understanding
GS	Generic Skills
PMKVY	Pradhan Mantri Kaushal Vikas Yojana
DDUGKY	Deen Dayal Upadhyaya Grameen Kaushalya Yojana
STT	Short Term Training
RPL	Recognition of Prior Learning
NAPS	National Apprenticeship Promotion Scheme
NQR	National Qualification Register
OJT	On the Job Training
NSQC	National Skill Qualification Committee

IS	Indian Standard
AI	Artificial Intelligence
AR	Augmented Reality
VR	Virtual Reality

Glossary

Term	Description
Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.
Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.

Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.

Annexure: Career Progression