



QUALIFICATION FILE

AI Embedded Product Developer (Electronics)

OEM Name: SIC - Artificial Intelligence

☒ Short Term Training (STT) ☐ Long Term Training (LTT) ☐ Apprenticeship

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

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

NCrF/NSQF Level: 4.5

Submitted By:

Electronics Sector Skills Council of India (ESSCI)

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AI Embedded Product Developer (Electronics)

OEM Name: SIC - Artificial Intelligence

Table of Contents

Section 1: Basic Details.....	3
Section 2: Module Summary	5
NOS/s of Qualifications	5
Mandatory NOS/s:.....	5
Elective NOS/s:.....	5
Optional NOS/s:.....	6
Assessment - Minimum Qualifying Percentage.....	6
Section 3: Training Related	6
Section 4: Assessment Related	7
Section 5: Evidence of the need for the Qualification.....	8
Section 6: Annexure & Supporting Documents Check List	8
Annexure: Evidence of Level.....	9
Annexure: Tools and Equipment (Lab Set-Up).....	10
Annexure: Industry Validations Summary	11
Annexure: Training & Employment Details	11
Annexure: Blended Learning	13
Annexure: Detailed Assessment Criteria.....	14
Annexure: Assessment Strategy	20
Annexure: Acronym and Glossary	21

Section 1: Basic Details

1.	Qualification Name	AI Embedded Product Developer (Electronics)																			
2.	Sector/s	Electronics																			
3.	Type of Qualification: ☒ New ☐ Revised ☐ Has Electives/Options ☒ OEM	NQR Code & version of existing/previous qualification: <i>(change to previous, once approved)</i>	Qualification Name of existing/previous version:																		
4.	a. OEM Name b. Qualification Name <i>(Wherever applicable)</i>	a- SIC - Artificial Intelligence b- AI Embedded Product Developer (Electronics)																			
5.	National Qualification Register (NQR) Code & Version <i>(Will be issued after NSQC approval)</i>	QG-4.5-EH-03602-2025-V1-ESSCI	1. NCrF/NSQF Level: 4.5																		
6.	Award (Certificate/Diploma/Advance Diploma/ Any Other) <i>(Wherever applicable specify multiple entry/exits also & provide details in annexure)</i>	Certificate																			
7.	Brief Description of the Qualification	The "SIC - Artificial Intelligence" Qualification will provide a comprehensive introduction to Python programming and essential libraries like NumPy and Pandas for data analysis. It will also cover data visualization using Matplotlib. The course emphasizes practical programming skills, offering hands-on experience to aspiring Python developers. Additionally, it introduces key Machine Learning concepts, allowing participants from any background to acquire the skills necessary to become an AI Engineer.																			
8.	Eligibility Criteria for Entry for Student/Trainee/Learner/Employee	a. Entry Qualification & Relevant Experience: <table border="1"> <thead> <tr> <th>S. No.</th> <th>Academic/Skill Qualification (with Specialization - if applicable)</th> <th>Required Experience (with Specialization - if applicable)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>UG Certificate (Electronics, Electrical, Computer science, Artificial Intelligence)</td> <td>No Experience required</td> </tr> <tr> <td>2</td> <td>3 Year diploma after 10th (Electronics, Electrical, Computer science, Artificial Intelligence)</td> <td>No Experience required</td> </tr> <tr> <td>3</td> <td>12th (Science)</td> <td>1.5 years relevant experience</td> </tr> <tr> <td>4</td> <td>10th Grade pass</td> <td>3 years relevant experience</td> </tr> <tr> <td>5</td> <td>Previous relevant Qualification of NSQF Level 4</td> <td>1.5 years relevant experience</td> </tr> </tbody> </table> b. Age: 18 years		S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)	1	UG Certificate (Electronics, Electrical, Computer science, Artificial Intelligence)	No Experience required	2	3 Year diploma after 10 th (Electronics, Electrical, Computer science, Artificial Intelligence)	No Experience required	3	12 th (Science)	1.5 years relevant experience	4	10th Grade pass	3 years relevant experience	5	Previous relevant Qualification of NSQF Level 4	1.5 years relevant experience
S. No.	Academic/Skill Qualification (with Specialization - if applicable)	Required Experience (with Specialization - if applicable)																			
1	UG Certificate (Electronics, Electrical, Computer science, Artificial Intelligence)	No Experience required																			
2	3 Year diploma after 10 th (Electronics, Electrical, Computer science, Artificial Intelligence)	No Experience required																			
3	12 th (Science)	1.5 years relevant experience																			
4	10th Grade pass	3 years relevant experience																			
5	Previous relevant Qualification of NSQF Level 4	1.5 years relevant experience																			
10.	Credits Assigned to this Qualification, Subject to Assessment <i>(as per National Credit Framework (NCrF))</i>	11.6	11. Common Cost Norm Category (I/II/III) <i>(wherever applicable):</i> I																		

12.	Any Licensing requirements for Undertaking Training on This Qualification <i>(wherever applicable)</i>	NA																						
13.	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 ☐ Online ☒ Blended <table border="1"> <thead> <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> </thead> <tbody> <tr> <td>Classroom (offline)</td> <td>00:00</td> <td>80:00</td> <td>00:00</td> <td>00:00</td> <td>350:00</td> </tr> <tr> <td>Online</td> <td>270:00</td> <td>00:00</td> <td>00:00</td> <td>00:00</td> <td></td> </tr> </tbody> </table> <i>(Refer Blended Learning Annexure for details)</i>					Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	OJT Recommended (Hours)	Total (Hours)	Classroom (offline)	00:00	80:00	00:00	00:00	350:00	Online	270:00	00:00	00:00	00:00	
Training Delivery Modes	Theory (Hours)	Practical (Hours)	OJT Mandatory (Hours)	OJT Recommended (Hours)	Total (Hours)																			
Classroom (offline)	00:00	80:00	00:00	00:00	350:00																			
Online	270:00	00:00	00:00	00:00																				
14.	Aligned to NCO/ISCO Code/s <i>(if no code is available mention the same)</i>	NCO-2015/2511.0106																						
15.	Progression path after attaining the qualification <i>(Please show Professional and Academic progression)</i>	Embedded Full Stack IoT Analyst (ELE/Q1404)																						
16.	Other Indian languages in which the Qualification & Model Curriculum are being submitted	Hindi																						
17.	Is similar Qualification(s) available on NQR-if yes, justification for this qualification	☐ Yes ☒ No URLs of similar Qualifications:																						
18.	Is the Job Role Amenable to Persons with Disability	☐ Yes ☒ No If “Yes”, specify applicable type of Disability:																						
19.	How Participation of Women will be Encouraged	No gender sensitization																						
20.	Are Greening/ Environment Sustainability Aspects Covered <i>(Specify the NOS/Module which covers it)</i>	☐ Yes ☒ No																						
21.	Is Qualification Suitable to be Offered in Schools/Colleges	Schools ☒ Yes ☐ No Colleges ☒ Yes ☐ No																						
22.	Name and Contact Details of Submitting / Awarding Body SPOC <i>(In case of CS or MS, provide details of both Lead AB & Supporting ABs)</i>	Name: Saleem Ahmed Email: ceo@essc-india.org Website: https://www.essc-india.org/ Contact No.: 011 – 8447738501																						
23.	Final Approval Date by NSQC: 18.02.2025	24. Validity Duration: 3 Years			25. Next Review Date: 18.02.2028																			

Section 2: Module Summary

NOS/s of Qualifications

(In exceptional cases these could be described as components)

Mandatory NOS/s:

Specify the training duration and assessment criteria at NOS/ Module level. For further details refer curriculum document.

Th.-Theory **Pr.**-Practical **OJT**-On the Job **Man.**-Mandatory Training **Rec.**-Recommended **Proj.**-Project

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/ Non-Core	NCrF/ NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) (if applicable)
1.	Introduction to Artificial Intelligence	ELE/N1420 & V1.0	Core	4.5	1	30:00	00:00	00:00	00:00	30:00	100	0	0	0	100	20
2.	Advanced Mathematics and Exploratory Data Analysis for Artificial Intelligence	ELE/N1421 & V1.0	Core	4.5	3	90:00	00:00	00:00	00:00	90:00	100	0	0	0	100	25
3.	Machine Learning	ELE/N1422 & V1.0	Core	4.5	3	90:00	00:00	00:00	00:00	90:00	100	0	0	0	100	25
4.	NLP, Neural Networks, Deep Learning, and AI Capstone	ELE/N1423 & V1.0	Core	4.5	4.6	60:00	80:00	00:00	00:00	140:00	50	20	30	0	100	30
Duration (in Hours) / Total Marks					11.6	270:00	80:00	00:00	00:00	350:00	350	20	30	0	400	100

Elective NOS/s:

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/ Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) (if applicable)
1.																
2.																
Duration (in Hours) / Total Marks																

Optional NOS/s:

S. No	NOS/Module Name	NOS/Module Code & Version (if applicable)	Core/ Non-Core	NCrF/NSQF Level	Credits as per NCrF	Training Duration (Hours)					Assessment Marks					
						Th.	Pr.	OJT-Man.	OJT-Rec.	Total	Th.	Pr.	Proj.	Viva	Total	Weightage (%) (if applicable)
1.																
2.																
Duration (in Hours) / Total Marks																

Assessment - Minimum Qualifying Percentage

Please specify **any one** of the following:

Minimum Pass Percentage – Aggregate at NOS level: 70 % (Every Trainee should score specified minimum aggregate passing percentage at qualification level to successfully clear the assessment.)

Minimum Pass Percentage – NOS/Module-wise: _____ (Every Trainee should score specified minimum passing percentage in each mandatory and selected elective NOS/Module to successfully clear the assessment.)

Section 3: Training Related

1.	Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)	BE/ B. Tech (Electrical/Electronics/Computer science/ Artificial Intelligence) with 1 years industrial and 1-year training experience in the Artificial Intelligence field. Or Diploma/ITI (Electrical/Electronics/Computer science/ Artificial Intelligence) with 2 years industrial and 1-year training experience in the Artificial Intelligence field Or Certified in relevant CITS Trade
2.	Master Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)	BE/ B. Tech (Electrical/Electronics/Computer science/ Artificial Intelligence) with 2 years industrial and 1-year training experience in the Artificial Intelligence field. Or Diploma/ITI (Electrical/Electronics/Computer science/ Artificial Intelligence) with 3 years industrial and 2-year training experience in the Artificial Intelligence field Or Certified in relevant CITS Trade

3.	Tools and Equipment Required for Training	☒ Yes ☐ No (If “Yes”, details to be provided in Annexure)
4.	In Case of Revised Qualification, Details of Any Upskilling Required for Trainer	NA

Section 4: Assessment Related

1.	Assessor’s Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	BE/ B. Tech (Electrical/Electronics/Computer science/ Artificial Intelligence with 2 years industrial and 1 years training experience in the Artificial Intelligence field Or Diploma/ITI (Electrical/Electronics/Computer science/ Artificial Intelligence) with 3 years industrial and 2 years training experience in the Artificial Intelligence field Or Certified in relevant CITS Trade
2.	Proctor’s Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	BE/ B. Tech (Electrical/Electronics/Computer science/ Artificial Intelligence) with 2 years industrial and 2 years training experience in the Artificial Intelligence field Or Diploma/ITI (Electrical/Electronics/Computer science/ Artificial Intelligence) with 5 years industrial and 2 years training experience in the Artificial Intelligence field Or Certified in relevant CITS Trade
3.	Lead Assessor’s/Proctor’s Qualification and experience in relevant sector (in years) (as per NCVET guidelines)	BE/ B. Tech (Electrical/ Mechanical/Electronics/Computer science) with 2 years industrial and 2 years training experience in the Artificial Intelligence field Or Diploma/ITI (Electrical/Mechanical/Electronics/Computer science) with 5 years industrial and 2 years training experience in the Artificial Intelligence field Or Certified in relevant CITS Trade
4.	Assessment Mode (Specify the assessment mode)	Blended
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 5: Evidence of the need for the Qualification

Provide Annexure/Supporting documents name.

1.	Latest Skill Gap Study (not older than 2 years) (Yes/No): Yes
2.	Latest Market Research Reports or any other source (not older than 2 years) (Yes/No): Yes
3.	Government /Industry initiatives/ requirement (Yes/No): Yes
4.	Number of Industry validation provided: 1
5.	Estimated nos. of persons to be trained and employed: 500
6.	Evidence of Concurrence/Consultation with Line Ministry/State Departments: In progress If “No”, why:

Section 6: 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)	Attached
2.	Annexure: List of tools and equipment relevant for qualification (Mandatory, except in case of online course)	Attached
3.	Annexure: Detailed Assessment Criteria (Mandatory)	Attached
4.	Annexure: Assessment Strategy (Mandatory)	Attached
5.	Annexure: Blended Learning (Mandatory, in case selected Mode of delivery is “Blended Learning”)	Filled
6.	Annexure: Multiple Entry-Exit Details (Mandatory, in case qualification has multiple Entry-Exit)	Filled
7.	Annexure: Acronym and Glossary (Optional)	Attached
8.	Supporting Document: Model Curriculum (Mandatory – Public view)	Attached
9.	Supporting Document: Career Progression (Mandatory - Public view)	Attached
10.	Supporting Document: Occupational Map (Mandatory)	Attached
11.	Supporting Document: Assessment SOP (Mandatory)	
12.	Any other document you wish to submit:	

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	Demands a wide range of specialized technical skill, clarity of knowledge and practice in broad range of activity involving standard and non-standard practices. 1. Gain the understanding and learn the power python and its ecosystem 2. Students are able to understand the concept of data analysis and its applications. 3. Students learn the categories of Machine Learning algorithms 4. Student will learn various techniques for improving the accuracy of ML models 5. Students will learn the concept of Neural network and its architecture and also learn about implementing deep learning models for Computer vision and Natural Language Processing	1- Possesses specialized operational knowledge and understanding of the work. 2- Have complete knowledge of the concept of time required for delivery; and Quality for a range of issues Hence Level 4.5	4.5
Professional and Technical Skills/ Expertise/ Professional Knowledge	Factual and theoretical knowledge in broad contexts within a field of work or study. 1. Work in python language for problem solving 2. Perform data analysis after retrieving data from different sources. 3. Apply and evaluate ML algorithms for predictive analysis 4. Students will optimize and fine tune the ML algorithms by using various statistical techniques and accuracy metrics 5. Choose appropriate models based on the AI problem	1. Possesses specialized professional and technical skills; displays clarity of professional knowledge and technical skills in a broad range of activities/ tasks. 2. Have knowledge of collecting and interpreting the available information, drawing conclusions & communicating the same Hence Level 4.5	4.5
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study. 1. Introduction to Employability Skills 2. Career Development & Goal Setting	1. Can explain Entrepreneurial Mindset and describe the importance of it in the context of opportunity curation for future jobs. 2. Can comfortably use most of the basic software with proficiency. 3. Have the ability to relate to the 5 pillars of Social Emotional Skills and describe the	4.5

	3. Becoming a Professional in the 21st Century 4. Constitutional values - Citizenship 5. Basic English Skills 6. Communication Skills 7. Essential Digital Skills 8. Financial and Legal Literacy 9. Customer Service 10. Entrepreneurship 11. Diversity & Inclusion 12. Getting Ready for Apprenticeship & Jobs	similarities between SES and Emotional Intelligence. Hence Level 4.5	
Broad Learning Outcomes/Core Skill	1. Apply python for data analysis problems using libraries. 2. Apply Machine Learning and Deep Learning models to solve various industry applications	1. Students are able to write and design programs on data analysis jobs 2. Apply the AI knowledge to improve the solution in real world. Hence Level 4.5	4.5
Responsibility	Responsibility of completing the work assigned and reporting the same as per standards. 1. Solving problem using python programming language 2. Performing Data Analytics Task 3. Implementing AI models using ML with good accuracy 4. Realization of AI use-cases in various domains using deep learning models	1. Takes complete responsibility for delivery and quality of own work and output. 2. Share the responsibility for the group task. Hence Level 4.5	4.5

Annexure: Tools and Equipment (Lab Set-Up)

List of Tools and Equipment

Batch Size: 30

S. No.	Tool / Equipment Name	Specification	Quantity for specified Batch size
1	Classroom	1 (30 Sq.m)	30
2	Students Chair	30	30
3	Students Table	30	30

4	Desktop computer with accessories	32 GB RAM with Camera, Headphone and Installed with: Linux/Windows, Wifi/internet connectivity Installed with software: NumPy, Pandas, Matplotlib, Seaborn, Scikit-Learn, tensorflow, Keras, PyTorch	10
5	Deskjet printer	1 No.	Paper-A4

Classroom Aids

The aids required to conduct sessions in the classroom are:

1. Whiteboard
2. Projector
3. Computer/Laptop
4. Chairs
5. Tables
6. Whiteboard marker

[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	Samsung	Mr Samarendra Behera	Designation -DGM	Gurgaon	+9199684 46412		NA

[Annexure: Training & Employment Details](#)**Training and Employment Projections:**

Year	Total Candidates	Women	People with Disability
	Estimated Training # Total	Estimated Training # Women	Estimated Training # PwD
2025-26	100	NA	NA
2026-27	200	NA	NA
2027-28	200	NA	NA

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

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.
- 2.

Content availability for previous versions of qualifications:

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

Languages in which Content is available:

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	30:70
2	☒ Imparting Soft Skills, Life Skills, and Employability Skills /Mentorship to Learners	• Self-Learning Videos • Broadcasts • Mobile Learning • Curated Digital content	30:70
3	☒ Showing Practical Demonstrations to the learners	• Video Content • E-Resource library • AR/ VR/ XR	30:70
4	☒ Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training	• Training tools (tools list attached) • Video Play • Presentations	30:70
5	☒ Tutorials/ Assignments/ Drill/ Practice	• Online Question Bank • Mobile Quick test app • MCQ based tests	30:70

6	☒ Proctored Monitoring/ Assessment/ Evaluation/ Examinations	- Assessment engine for Essays - Up-loadable file examinations - Mock test sessions	30:70
7	☒ On the Job Training (OJT)/ Project Work Internship/ Apprenticeship Training	- Online tests - Offline assessments	30:70

Annexure: Detailed Assessment Criteria

Detailed assessment criteria for each NOS/Module are as follows:

NOS/Modules	Assessment Criteria for Performance Criteria/Learning Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
ELE/N1420: Introduction to Artificial Intelligence	Module 1: Fundamentals of AI	32	0	0	0
	PC1: Define AI and identify its core components , such as machine learning, neural networks, and natural language processing.	8	-	-	-
	PC2: Trace the history and evolution of AI, including key milestones and pioneers.	8	-	-	-
	PC3: Identify real-world applications of AI across various industries like healthcare, finance, and automotive.	8	-	-	-
	PC4: Discuss ethical considerations in AI, such as privacy, bias, and transparency.	8	-	-	-
	Module 2: AI Techniques and Tools	32	0	0	0
	PC5: Differentiate between symbolic AI (rule-based systems) and sub-symbolic AI (machine learning and neural networks).	8	-	-	-
	PC6: Describe key AI techniques , including supervised learning, unsupervised learning, and reinforcement learning.	8	-	-	-
	PC7: List and explain AI tools like TensorFlow, PyTorch, and Keras, and understand their applications.	8	-	-	-
	PC8: Explore AI programming languages such as Python, R, and Julia, focusing on their strengths and use cases.	8	-	-	-

	Module 3: AI Project Lifecycle	36	0	0	0
	PC9: Outline the steps in an AI project lifecycle , including data collection, preprocessing, model training, and deployment.	9	-	-	-
	PC10: Understand the importance of data quality and quantity in AI projects.	9	-	-	-
	PC11: Describe the model building process , including algorithm selection and hyperparameter tuning.	9	-	-	-
	PC12: Explain model evaluation and deployment strategies , including monitoring and maintenance.	9	-	-	-
Nos Total		100	0	0	0
ELE/N1421: Advanced Mathematics and Exploratory Data Analysis for Artificial Intelligence	Module 1: Foundational Mathematics for Data Science	20	0	0	0
	PC1: Review basic algebra , including equations, inequalities, and their applications in data science problems.	3	-	-	-
	PC2: Solve functions and analyze their behavior using graphs for trend identification and predictive modeling.	3	-	-	-
	PC3: Understand probability principles , including random variables, probability distributions, and cumulative distribution functions.	3	-	-	-
	PC4: Apply probability distributions (e.g., normal, binomial) for uncertainty modeling in AI datasets.	3	-	-	-
	PC5: Explore linear algebra concepts like vector spaces and matrix operations for data transformation.	4	-	-	-
	PC6: Utilize calculus concepts (differentiation and integration) to optimize functions and minimize error in AI models.	4	-	-	-
	Module 2: Advanced Mathematics for Data Science	20	0	0	0
	PC7: Define vectors and perform operations like scalar multiplication, dot product, and cross product.	3	-	-	-
	PC8: Use matrix operations (addition, multiplication, inversion) to manipulate datasets and AI features.	3	-	-	-
	PC9: Apply eigenvalues and eigenvectors in dimensionality reduction for machine learning models.	3	-	-	-
	PC10: Use NumPy to efficiently perform matrix computations, including slicing, indexing, and broadcasting.	4	-	-	-

PC11: Understand confidence intervals to measure the reliability of statistical conclusions.	3	-	-	-
PC12: Explore statistical measures (mean, median, variance) to summarize data characteristics.	4	-	-	-
Module 3: Data Exploration with NumPy and Pandas	20	0	0	0
PC13: Create and manipulate NumPy arrays , including reshaping and handling multidimensional arrays.	3	-	-	-
PC14: Perform vectorized computations and broadcasting using NumPy for scalable AI workflows.	3	-	-	-
PC15: Use Pandas for loading, cleaning, and merging datasets, addressing missing values and duplicates.	3	-	-	-
PC16: Explore datasets with Pandas DataFrames and Series to summarize and transform data.	4	-	-	-
PC17: Perform advanced group-by operations with Pandas for aggregation and analytical insights.	3	-	-	-
PC18: Use NumPy and Pandas together to preprocess large datasets for machine learning models.	4	-	-	-
Module 4: Data Visualization and Insights	20	0	0	0
PC19: Create visualizations like histograms, line plots, and bar charts using Matplotlib for trend analysis.	3	-	-	-
PC20: Use Seaborn for advanced plotting, including heatmaps, pair plots, and violin plots.	3	-	-	-
PC21: Visualize data distributions and correlations using Seaborn's pair grid and categorical plots.	3	-	-	-
PC22: Interpret visual data insights to identify trends, outliers, and relationships in datasets.	3	-	-	-
PC23: Customize visualizations with annotations, legends, and styles to effectively communicate insights.	4	-	-	-
PC24: Use Matplotlib and Seaborn together to create publication-quality graphs for AI presentations.	4	-	-	-
Module 5: Probability and Statistical Analysis	20	0	0	0
PC25: Explain concepts of Bayesian probability and conditional probability in decision-making scenarios.	3	-	-	-

	PC26: Conduct hypothesis testing using methods like t-tests, chi-square tests, and ANOVA.	3	-	-	-
	PC27: Understand and interpret sampling distributions to assess variability in data analysis.	3	-	-	-
	PC28: Apply probability distributions to model data uncertainty, including normal, Poisson, and uniform distributions.	4	-	-	-
	PC29: Perform correlation and regression analysis to identify relationships and trends in datasets.	4	-	-	-
	PC30: Conduct statistical significance testing to validate hypotheses and evaluate model performance.	3	-	-	-
Nos Total		100	0	0	0
ELE/N1422: Machine Learning	Module 1: Fundamentals of Machine Learning	10	0	0	0
	PC1: Define supervised, unsupervised, and reinforcement learning, and explain their applications in AI.	3	-	-	-
	PC2: Describe the machine learning pipeline, including data preprocessing, feature selection, model training, and evaluation.	3	-	-	-
	PC3: Explain common evaluation metrics (e.g., accuracy, precision, recall, F1 score, confusion matrix, ROC curve, AUC).	4	-	-	-
	Module 2: Supervised Learning and Models	25	0	0	0
	PC4: Apply regression models (e.g., linear regression, polynomial regression) for numerical prediction.	5	-	-	-
	PC5: Implement classification models (e.g., logistic regression, decision trees) for categorical prediction.	5	-	-	-
	PC6: Define decision trees, describe tree-building algorithms (e.g., CART, ID3), and prune trees to avoid overfitting.	5	-	-	-
	PC7: Explain ensemble methods (e.g., Random Forest, Gradient Boosting) and their advantages over single models.	5	-	-	-
	PC8: Describe the Naïve Bayes algorithm and its assumptions, and apply it to classification tasks like text classification.	5	-	-	-
	Module 3: Advanced Supervised Learning	20	0	0	0
	PC9: Define Support Vector Machines (SVM), and explain concepts like hyperplanes, margins, and kernel tricks.	5	-	-	-
	PC10: Implement SVM models, tune parameters, and evaluate performance using metrics.	5	-	-	-

	PC11: Describe the K-Nearest Neighbors (KNN) algorithm and its applications in classification and regression.	5	-	-	-
	PC12: Implement KNN models, optimize parameters (e.g., number of neighbors, distance metrics), and evaluate performance.	5	-	-	-
	Module 4: Unsupervised Learning and Dimensionality Reduction	25	0	0	0
	PC13: Define unsupervised learning and explain its role in discovering hidden patterns in data.	5	-	-	-
	PC14: Explain clustering techniques (e.g., K-means, hierarchical clustering) and their use in grouping similar data points.	5	-	-	-
	PC15: Apply K-means clustering to datasets and interpret resulting clusters.	5	-	-	-
	PC16: Perform hierarchical clustering and visualize results using dendrograms.	5	-	-	-
	PC17: Describe Principal Component Analysis (PCA) and Linear Discriminant Analysis (LDA), and apply them for dimensionality reduction in high-dimensional data.	5	-	-	-
	Module 5: Advanced Techniques and Reinforcement Learning	20	-	-	-
	PC18: Explore advanced clustering methods (e.g., DBSCAN, Gaussian Mixture Models) and evaluate their suitability for datasets.	5	-	-	-
	PC19: Define reinforcement learning and explain key concepts such as agents, environments, states, actions, rewards, and policies.	5	-	-	-
	PC20: Implement basic reinforcement learning algorithms such as Q-learning and policy gradients.	5	-	-	-
	PC21: Apply reinforcement learning to practical problems like game-playing or robotic control.	5	-	-	-
Nos Total		100	0	0	0
ELE/N1423: NLP, Neural Networks, Deep Learning, and AI Capstone	Module 1: Natural Language Processing (NLP) and Text Mining	10	0	0	0
	PC1: Understand the fundamentals of Text Mining.	2	-	-	-
	PC2: Perform Text Pre-processing (e.g., tokenization, stemming, and lemmatization).	2	-	-	-
	PC3: Explore various types of Language Models (e.g., statistical, neural-based).	3	-	-	-

PC4: Practice NLP tasks using frameworks like Keras, including sentiment analysis and entity recognition.	3	-	-	-
Module 2: Basics of Neural Networks and Deep Learning	10	0	0	0
PC5: Define Neural Networks and explain their structure, including neurons, layers, and activation functions.	2	-	-	-
PC6: Describe the Backpropagation Algorithm and its role in training models.	2	-	-	-
PC7: Implement basic Neural Network models using Tensor/Flow/Keras.	3	-	-	-
PC8: Train and evaluate neural networks on simple datasets.	3	-	-	-
Module 3: Advanced Deep Learning Techniques	15	0	0	0
PC9: Explore advanced architectures like Convolutional Neural Networks (CNNs) for image processing.	3	-	-	-
PC10: Implement CNNs using Tensor/Flow/Keras and train them on image datasets.	4	-	-	-
PC11: Understand Recurrent Neural Networks (RNNs) for sequential data (e.g., time series, text).	4	-	-	-
PC12: Implement RNNs and Long Short-Term Memory (LSTM) networks for sequence prediction tasks.	4	-	-	-
Module 4: Specialized Deep Learning Models	15	0	0	0
PC13: Learn about Generative Adversarial Networks (GANs) for synthetic data generation.	3	-	-	-
PC14: Implement GANs for generating non-existent images and understand their dynamics.	4	-	-	-
PC15: Explore Auto encoders for unsupervised learning and data compression.	4	-	-	-
PC16: Apply Auto encoders for anomaly detection and demonising tasks.	4			
Module 5: AI Capstone Project and Design Thinking	0	20	30	0
PC17: Understand Design Thinking and its importance in problem-solving.	0	4	6	
PC18: Apply the Five Steps of Design Thinking to AI projects.	0	4	6	
PC19: Design and implement a complete AI project from scratch, incorporating NLP and deep learning concepts.	0	4	6	

	PC20: Select a problem domain, pre-process data, build, evaluate, and deploy AI models.	0	4	6	
	PC21: Present project outcomes, highlight challenges, findings, and propose future improvements.	0	4	6	
Nos Total		50	20	30	0
Grand Total		350	20	30	0

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.

- 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
- 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.
 - If 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.
- 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 are 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
- 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

On the Job:

1. Each module (which covers the job profile of SIC – Artificial Intelligence) will be assessed separately.
2. The candidate must score 50% in each module to successfully complete the OJT.
3. Tools of Assessment that will be used for assessing whether the candidate is having desired skills and etiquette of dealing with customers, understanding needs & requirements, assessing the customer and perform Soft Skills effectively:
 - Videos of Trainees during OJT
 - Answer Sheets of Question Banks
 - Assessing the Log Book entries of Trainees at Employer location
 - Employer Performance Feedback.
4. Assessment of each Module will ensure that the candidate is able to:
 - Understand the theoretical concept of Technology
 - Understand practical aspect of Semiconductor and perform simulation techniques
 - Perform testing and maintenance of Artificial Intelligent Fundamentals
 - Work effectively at the workplace

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
NOS	National Occupational Standard(s)

NQR	National Qualification Register
NSQF	National Skills Qualifications Framework
OJT	On the Job Training

Glossary

Term	Description
National Occupational Standards (NOS)	NOS define the measurable performance outcomes required from an individual engaged in a particular task. They list down what an individual performing that task should know and also do.
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 on the basis of their main economic function, product, service or technology.
Long Term Training	Long-term skilling means any vocational training program undertaken for a year and above. https://ncvet.gov.in/sites/default/files/NCVET.pdf