QUALIFICATION FILE–Standalone NOS

Data Analysis with Python and SQL

☐ 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: 5

Submitted By:

National Institute of Electronics and Information Technology (NIELIT)

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Section 1: Basic Details

1.	**NOS-Qualification Name**	**Data Analysis with Python and SQL**	
2.	**Sector/s**	**IT-ITeS**	
3.	**Type of Qualification ☒ New ☐ Revised**	**NQR Code & version of the existing /previous qualification: NA**	**Qualification Name of the existing/previous version: NA**
4.	**National Qualification Register (NQR) Code & Version**	NG-05-IT-01425-2023-V1-NIELIT & Version 1	**5. NCrF/NSQF Level:** 5
6.	**Brief Description of the Standalone NOS**	The "Data Analysis with Python and SQL" upskilling course provides participants with a comprehensive understanding of data analysis techniques using two powerful tools: Python programming language and SQL (Structured Query Language). Through hands-on exercises and real-world examples, participants learn to manipulate and analyze data using Python libraries like Pandas and NumPy. The course covers SQL queries for data extraction, transformation, and analysis, ensuring participants acquire a strong foundation in both languages. This dual-focus approach equips learners with the skills needed to handle large datasets, perform data cleaning and exploration, and derive meaningful insights for informed decision-making. Whether for business analysts, data scientists, or professionals seeking to enhance their analytical capabilities, this course offers a valuable skill set in the ever-evolving landscape of data analysis. Throughout the course, participants engage in practical scenarios, applying Python and SQL to solve real-world data problems. The curriculum includes topics such as data visualization, statistical analysis, and integrating Python and SQL for a holistic approach to data analysis. By the course's conclusion, participants are adept at leveraging Python and SQL for effective data-driven decision-making, making them valuable contributors to data-centric roles across various industries.	

<table>
<tr><td>7.</td><td>Eligibility Criteria for Entry for a 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>Relevant Experience (with Specialization - if applicable)</th></tr>
<tr><td>1</td><td>Pursuing^ Final Year B.Tech in any branch of Engineering*

Or

Pursuing^ Final Year MCA
Or

Pursuing^ Final Year B.Sc. in any branch of Sciences*
Or

Pursuing^ Final Year B.Sc. in IT/CS/Electronics/allied subjects

*Students should have relevant knowledge of the Networking and programming concepts.

#Students with the above entry requirements are eligible to take the course subject to clearing the written test comprising of Analytical Reasoning, Mathematics and English

^Passout students in the above entry requirements are also eligible for the course.</td><td>NA</td></tr>
</table>
b. Age: No bar</td></tr>
<tr><td>8.</td><td>Credits Assigned to this NOS-Qualification, Subject to Assessment (as per National Credit Framework (NCrF))</td><td>4</td><td>9. Common Cost Norm Category (I/II/III) (wherever applicable): Category-II</td></tr>
<tr><td>10.</td><td>Any Licensing Requirements for Undertaking Training on This Qualification (wherever applicable)</td><td colspan="2">Not Applicable</td></tr>
</table>

<table>
<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>☒ Offline ☐ Online ☐ 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>60</td><td>60</td><td>120</td></tr></table>The mode of delivery shall be based on the regional demand and can be offered in any of the above modes mentioned.</td></tr>
<tr><td>12.</td><td>Assessment Criteria</td><td><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>100</td><td>0</td><td>0</td><td>0</td><td>100</td><td>50</td></tr></table>The centralised online assessment is conducted by the Examination Wing, NIELIT Headquarters.</td></tr>
<tr><td>13.</td><td>Is the NOS Amenable to Persons with Disability</td><td>☒ Yes ☐ No
If “Yes”, specify applicable type of Disability:
a. Locomotor Disability: Leprosy Cured Person, Dwarfism, Muscular Dystrophy and Acid Attack Victims
b. Visual Impairment: Low Vision</td></tr>
<tr><td>14.</td><td>Progression Path After Attaining the Qualification, wherever applicable</td><td>Data Analyst
Database Analyst
Reporting Analyst
Operations Analyst
Financial Analyst
Business Analyst</td></tr>
<tr><td>15.</td><td>How will the participation of women be encouraged?</td><td>Participation by women can be ensured through Government Schemes. Occasionally, exclusive batches for women would be run for the proposed courses. Funding is available for women’s participation under other schemes launched by the Government from time to time.</td></tr>
</table>

16.	**Other Indian languages in which the Qualification & Model Curriculum are being submitted**	Only English	
17.	**Is similar NOS available on NQR-if yes, justification for this qualification**	☐**Yes** ☒ **No**	
18.	**Name and Contact Details Submitting / Awarding Body SPOC** *(In the case of CS or MS, provide details of both Lead AB & Supporting ABs)*	A. Name: SHRI NILADRI DAS Position in the organization: Scientist E Address: NIELIT Agartala Tel number(s): 8794028299 E-mail address: niladridas@nielit.gov.in B. Name: SHRI BINOY DAS Position in the organization: Senior Technical Officer Address: NIELIT Agartala Tel number(s): 8794822459 E-mail address: erbinoy@nielit.gov.in	
19.	**Final Approval Date by NSQC: 30/11/2023**	**20. Validity Duration: 3 years**	**21. Next Review Date: 30/11/2026**

Section 2: Training Related

1.	**Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)**	B.Tech or Equivalent as per NCrF with 15+ years of experience
2.	**Master Trainer's Qualification and experience in the relevant sector (in years) (as per NCVET guidelines)**	B.Tech or Equivalent as per NCrF with 15+ years of experience
3.	**Tools and Equipment Required for the Training**	☒ Yes ☐No Available at Annexure-II
4.	**In Case of Revised NOS, details of Any Upskilling Required for Trainer**	Not Applicable

Section 3: Assessment Related

1.	**Assessor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	B.Tech or Equivalent as per NCrF with 15+ years of experience
2.	**Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines), (wherever applicable)*	The assessor carries out theory online assessments through the remote proctoring methodology. Theory examination would be conducted online and the paper comprises MCQ. Conduct of assessment is through trained proctors. Once the test begins, remote proctors have full access to the candidate's video feeds and computer screens. Proctors authenticate the candidate based on registration details, pre-test image captured and I-card in possession of the candidate. Proctors can chat with candidates or give warnings to candidates. Proctors can also take screenshots, terminate a specific user's test session, or re-authenticate candidates based on video feeds.
3.	**Lead Assessor's/Proctor's Qualification and experience in relevant sector (in years)** *(as per NCVET guidelines)*	External Examiners/ Observers (Subject matter experts) are deployed including NIELIT scientific officers who are subject experts for evaluation of Practical examination/ internal assessment / Project/ Presentation/ assignment and Major Project (if applicable). Qualification is generally B.Tech.
4.	**Assessment Mode***(Specify the assessment mode)*	Centralized online examination will be conducted
5.	**Tools and Equipment Required for Assessment**	Same as for training ☒ Yes ☐ No

Section 4: Evidence of the Need for the Standalone NOS

1.	Government /Industry initiatives/ requirement (Yes/No): Yes.
2.	Number of Industry validation provided: 4
3.	Estimated number of people to be trained: 1000 persons per year shall be trained.
4.	Evidence of Concurrence/Consultation with Line/State Departments (In case of regulated sectors): No NIELIT is recognised as AB and AA under the Government Category. NIELIT is the HRD arm of MeitY, GoI.

Section 5: Annexure & Supporting Documents Check List

Specify Annexure Name / Supporting document file name

1.	**Annexure:** NCrF/NSQF level justification based on NCrF/NSQF descriptors *(Mandatory)*	*Available at* Annexure-I: Evidence of Level
2.	**Annexure:** List of tools and equipment relevant for NOS *(Mandatory, except in case of online course)*	*Available at* Annexure-II: Tools and Equipment
3.	**Annexure: Industry Validation**	*Available at* Annexure-III: Industry Validation
4.	**Annexure: Training Details**	*Available at* Annexure-IV: Training Details
5.	**Annexure:** Blended Learning *(Mandatory, in case the selected Mode of delivery is Blended Learning)*	*Available at* Annexure-V: Blended Learning
6.	**Annexure/Supporting Document:** Standalone NOS- Performance Criteria Details Annexure/Document with PC-wise detailing as per NOS format (Mandatory- Public view)	*Available at* Annexure-VI: Performance Criteria
7.	**Annexure:** Performance and Assessment Criteria *(Mandatory)*	*Available at* Annexure-VII: Detailed Assessment Criteria
8.	**Annexure:** Assessment Strategy *(Mandatory)*	*Available at* Annexure-VIII: Assessment Strategy
9.	**Annexure:** Acronym and Glossary *(Optional)*	*Available at* Annexure-IX: Acronym and Glossary
10.	**Supporting Document:** Model Curriculum	*Available at* Annexure-A: Model Curriculum

Annexure-I: 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	This course for professionals necessitates a solid theoretical foundation in key areas. Participants are expected to grasp fundamental principles of data analysis, statistical concepts, and database management. A strong understanding of Python programming language is imperative, encompassing proficiency in using libraries like Pandas and NumPy for data manipulation and analysis. Moreover, a comprehensive theoretical knowledge of SQL, including database querying, joins, and data transformation operations, is essential. Theoretical comprehension of data visualization techniques and statistical methods for drawing insights from datasets is also a prerequisite. This theoretical knowledge forms the basis for practical application, enabling professionals to proficiently analyze and derive meaningful insights from complex datasets using Python and SQL in real-world scenarios.	Demonstrative of a high-level skill set and expertise, the course positions individuals for roles demanding advanced capabilities in data analysis utilizing Python and SQL.	5
Professional and Technical Skills/ Expertise/ Professional Knowledge	The candidate will acquire a versatile skill set, enabling them to navigate the complexities of Data Analytics, contribute to organizational success, and stay abreast of industry best practices and emerging technologies in the Python and SQL	Individuals completing this qualification are likely to possess the expertise required for roles demanding advanced and specialized knowledge in the field of Python & SQL.	5
Employment Readiness & Entrepreneurship Skills & Mind-set/Professional Skill	Professional skills collectively enable individuals to contribute effectively to organizations leveraging data analytics, adapt to changing industry demands, and excel in roles such as Data Analyst, Database Analyst, Reporting Analyst, Operations Analyst, Financial Analyst, Business Analyst or other specialized positions within the cloud computing domain.	Candidates will be learning effective communications which will make them smart in communicating with various companies and people.	5

Broad Learning Outcomes/Core Skill	Collectively prepare individuals to navigate the complexities of Data Analytics, equipping them with the skills needed to contribute to organizational success and adapt to the evolving landscape of Python & SQL technologies.	Candidate can perform well under supervision of team lead	5
Responsibility	Individuals may find themselves involved in strategic decision-making, hands-on implementation, or a combination of both, depending on their chosen career path within the Data Analytics landscape.	Takes complete responsibility for delivery and quality of own work and output as also the subordinates. Shares responsibility for the group tasks.	5

Annexure II: 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	GUI based Operating System, Jupyter Notebooks or RStudio pandas (Python) or dplyr (R) Matplotlib/Seaborn (Python) or ggplot2 (R), SQLite or MySQL, Tableau or Power BI, Slack, Google Colab, Kaggle, TensorFlow or PyTorch, NLTK (Python) or tm (R), QGIS or ArcGIS	30
5	Deskjet printer	1 No.	Paper-A4

Classroom Aids for offline and blended mode of training:

The aids required to conduct sessions in the classroom are:

1. LCD Projector/Smart Board
2. Pin-up Board
3. WhiteBoard, Markers

Annexure III: Industry Validations/ Government Recognition Summary

S. No	Organization Name	Representative Name	Designation	Contact Address	Contact Phone No	E-mail ID
1	Software World	Amrita Saha	Proprietor	Ujan Abhoynagar, Manipuripara, Agartala, Tripura(West)	7005261744	support@softwareworld.Co.In
2	Bada Biplab Power Solution LLP	Iduli Debbarma	Designated Partner	Agartala West Tripura, Pin: 799003	9436740983	bbpsllp@gmail.com
3	Krishna Industrial Services	Debajit Dey	Proprietor	Badharghat Chowmuhani Agartala, Pin: 799003	9862770077	jbyacademy@gmail.com
4	JB Youth Computer Solution & Educational Society	Nishi Kanta Das	Project Coordinator	Badharghat Chowmuhani, Siddi Ashram, Agartala	9436740983	jbyacademy@gmail.com

Annexure IV : Training Details

Training Projections:

Year	Estimated Training # of Total Candidates	Estimated training# of Women	Estimated training# of People with Disability
2023-24	1000	200	20
2024-25	1000	200	20
2025-26	1000	200	20

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

Annexure V: Blended Learning

Blended Learning Estimated Ratio &Recommended Tools:

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

S. No.	Select the Components of the NOS	List Recommended Tools – for all Selected Components	Offline: Online Ratio
1	Theory/ Lectures - Imparting theoretical and conceptual knowledge	Online interaction platforms like JitSi Meet, Bharat VC, Google Meet, MS Teams, etc.	60:40
2	Imparting Soft Skills, Life Skills and Employability Skills /Mentorship to Learners	NA	NA
3	Showing Practical Demonstrations to the learners	Online interaction platforms like JitSi Meet, Bharat VC, Google Meet, MS Teams, etc.	60:40
4	Imparting Practical Hands-on Skills/ Lab Work/ workshop/ shop floor training	PCs/Laptops	100:0
5	Tutorials/ Assignments/ Drill/ Practice	Online interaction platforms like JitSi Meet, Bharat VC, Google Meet, MS Teams, etc.	50:50
6	Proctored Monitoring/ Assessment/ Evaluation/ Examinations	NIELIT Online Examination	Online: 100% Theory
7	On the Job Training (OJT)/ Project Work Internship/ Candidate Training	NA	NA

Annexure VI : Standalone NOS- Performance Criteria details

1. Description:

The upskilling course on Cloud Computing with AWS and Azure will be assessed based on their ability to deploy and manage cloud resources, implement security measures, optimize costs, and collaborate effectively in a team environment while staying informed about the latest updates in the rapidly evolving cloud technologies.

2. Scope:

The scope covers the following:

- Expand career opportunities by providing hands-on experience with leading cloud platforms.
- Gain proficiency in deploying and managing applications, enhancing their competitiveness in the evolving IT landscape.
- Equips professionals with sought-after skills for roles in cloud architecture, development, and administration.

3. Elements and Performance Criteria

Elements	Performance Criteria
Data Modelling Concepts	PC1: Data modelling should adhere to principles of clarity, consistency, accuracy, completeness, and reusability. PC2: Data modelling includes improved data quality, understanding, access, and decision-making.
DBMS and RDBMS	PC3: DBMS and RDBMS should effectively manage, organize, and retrieve data while ensuring data integrity and security. PC4: DBMS and RDBMS should provide efficient data access, query processing, and transaction management capabilities.
RDBMS Functionality	PC5: RDBMS should effectively organize and store data in tables, optimize data retrieval and analysis, and maintain data integrity and consistency. PC6: RDBMS should facilitate data segregation, joining, and aggregation to enhance query performance and minimize redundancy.
NoSQL	PC7: Efficiently store and retrieve data with high scalability and availability while providing flexibility in data modelling. PC8: High availability, replication, and consistency to ensure data integrity and reliability for mission-critical applications.
Introduction to Python	PC9: Learners should gain a basic understanding of Python programming concepts, including environment setup, syntax, variables, data types, operators, data structures, control flow statements, and functions.

	PC10: Learners should be able to write simple Python programs to solve basic programming problems.
Functions	PC11: Functions encompass designing efficient and reusable user-defined functions, utilizing inbuilt functions effectively, and understanding the role of lambda functions in concise and functional programming. PC12: Python date and time handling include accurately managing and formatting dates and times, working with various time zones and date-related calculations. For modules and packages, it involves organizing and importing modules and packages efficiently, maintaining clear code structure, and managing dependencies.
Classes And Objects	PC13: Working with classes and objects in Python include a thorough understanding of the concepts, the ability to create and manipulate NumPy ndarrays, perform array creation and operations, iterate over arrays effectively, and utilize indexing and slicing techniques to access data efficiently. PC14: NumPy functions involve proficiency in using various NumPy functions and methods for data manipulation. For Pandas, performance criteria include the ability to work with Series and DataFrames, perform descriptive statistics, read and write CSV files, and efficiently index and slice DataFrames.
DataFrame Basic Functions	PC15: DataFrame Join() and GroupBy() should effectively combine and manipulate data while preserving its integrity and structure. PC16: DataFrame Join() should efficiently combine data from multiple DataFrames based on common attributes, while GroupBy() should effectively aggregate and analyze data based on specific criteria.
Data Modelling Concepts	PC17: Data modelling should adhere to principles of clarity, consistency, accuracy, completeness, and reusability. PC18: Data modelling includes improved data quality, understanding, access, and decision-making.

4. Knowledge and Understanding (KU):

The individual on the job needs to know and understand:

KU1. Providing a foundational Knowledge and Understanding (KU) of data analysis techniques using Python and SQL.

KU2. Gaining proficiency in manipulating and analyzing data using Python libraries like Pandas and NumPy, as well as executing SQL queries for data extraction and transformation.

KU3. Covers essential data analysis concepts, including data cleaning, exploration, statistical analysis, and data visualization.

KU4. Hands-on exercises and practical applications, learners develop the skills needed to handle large datasets and derive meaningful insights.

KU5. A robust understanding of data analysis, making it applicable to roles in business analytics, data science, and other data-centric fields.

5. Generic Skills (GS):

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

GS1. Follow instructions, guidelines and procedures

GS2. Listen effectively and communicate information accurately

GS3. Apply formatting features to achieve the desired results

Annexure VII: Assessment Criteria

Detailed PC-wise assessment criteria and assessment marks for the NOS are as follows:

S. No.	Assessment Criteria for Performance Criteria	Theory Marks	Practical Marks	Project Marks	Viva Marks
Data Modelling Concepts	PC1: Data modelling should adhere to principles of clarity, consistency, accuracy, completeness, and reusability. PC2: Data modelling includes improved data quality, understanding, access, and decision-making.	10	-	-	-
DBMS and RDBMS	PC1: DBMS and RDBMS should effectively manage, organize, and retrieve data while ensuring data integrity and security. PC2: DBMS and RDBMS should provide efficient data access, query processing, and transaction management capabilities.	10	-	-	-
RDBMS Functionality	PC1: RDBMS should effectively organize and store data in tables, optimize data retrieval and analysis, and maintain data integrity and consistency. PC2: RDBMS should facilitate data segregation, joining, and aggregation to enhance query performance and minimize redundancy.	10	-	-	-
NoSQL	PC1: Efficiently store and retrieve data with high scalability and availability while providing flexibility in data modelling. PC2: High availability, replication, and consistency to ensure data integrity and reliability for mission-critical applications.	10	-	-	-
	PC1: Learners should gain a basic understanding of Python programming concepts, including environment setup, syntax, variables, data types, operators,	10	-	-	-

Introduction to Python	data structures, control flow statements, and functions. PC2: Learners should be able to write simple Python programs to solve basic programming problems.				
Functions	PC1: Functions encompass designing efficient and reusable user-defined functions, utilizing inbuilt functions effectively, and understanding the role of lambda functions in concise and functional programming. PC2: Python date and time handling include accurately managing and formatting dates and times, working with various time zones and date-related calculations. For modules and packages, it involves organizing and importing modules and packages efficiently, maintaining clear code structure, and managing dependencies.	15	-	-	-
Classes And Objects	PC1: Working with classes and objects in Python include a thorough understanding of the concepts, the ability to create and manipulate NumPy ndarrays, perform array creation and operations, iterate over arrays effectively, and utilize indexing and slicing techniques to access data efficiently. PC2: NumPy functions involve proficiency in using various NumPy functions and methods for data manipulation. For Pandas, performance criteria include the ability to work with Series and DataFrames, perform descriptive statistics, read and write CSV files, and efficiently index and slice DataFrames.	15	-	-	-
DataFrame Basic Functions	PC1: DataFrame Join() and GroupBy() should effectively combine and manipulate data while preserving its integrity and structure. PC2: DataFrame Join() should efficiently combine data from multiple DataFrames based on common attributes, while GroupBy() should effectively aggregate and analyze data based on specific criteria.	10	-	-	-
Data Modelling Concepts	PC1: Data modelling should adhere to principles of clarity, consistency, accuracy, completeness, and reusability. PC2: Data modelling includes improved data quality, understanding, access, and decision-making.	10	-	-	-
	Total Marks	**100**	**-**	**-**	**-**

Annexure VIII: 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.

Assessment of the qualification evaluates candidates to ascertain that they can integrate knowledge, skills and values for carrying out relevant tasks as per the defined learning outcomes and assessment criteria.

The underlying principle of assessment is fairness and transparency. The evidence of the outcomes and assessment criteria. competence acquired by the candidate can be obtained by conducting Theory (Online) examination.

About Examination Pattern:

1. The question papers for the theory exams are set by the Examination wing (assessor) of NIELIT HQS.
2. The assessor assigns roll number.
3. The assessor carries out theory online assessments. Theory examination would be conducted online and the paper comprise of MCQ
4. Pass percentage would be 50% marks.
5. The examination will be conducted in English language only.

Quality assurance activities: A pool of questions is created by a subject matter expert and moderated by other SME. Test rules are set beforehand. Random set of questions which are according to syllabus appears which may differ from candidate to candidate. Confidentiality and impartiality are maintained during all the examination and evaluation processes

Annexure IX : Acronym and Glossary

Acronym

Acronym	Description
AA	Assessment Agency
AB	Awarding Body
NCrF	National Credit Framework
NOS	National Occupational Standard(s)
NQR	National Qualification Register
NSQF	National Skills Qualifications Framework

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.