

QUALIFICATION FILE - CONTACT DETAILS OF THE SUBMITTING BODY

Name and address of submitting body:

NATIONAL INSTITUTE OF ELECTRONICS AND INFORMATION TECHNOLOGY
NIELIT Bhawan, Plot No. 3, PSP Pocket, Sector-8,
Dwarka, New Delhi-110077

Name and contact details of individual dealing with the submission

Name	:	Ishant Kumar Bajpai
Position in the organization	:	Scientist-'C'
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List of documents submitted in support of the Qualifications File

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| 1. Annexure I – Evidence of Job /Requirement in Industry |
| 2. Annexure II – Detailed Model Curriculum/Syllabus |

NSQF QUALIFICATION FILE

Approved in 14th NSQC, Dated: 30th December, 2021

SUMMARY

1	Qualification Title	IoT Data Analyst
2	Qualification Code, if any	NIELIT/ES/L6/045 Sector: Electronics
3	NCO code and occupation	2152.9900 (Electronics Engineers, Other)
4	Nature and purpose of the qualification (Please specify whether qualification is short term or long term)	Nature: ❖ This Certificate Course is targeted for creating qualified professional in the field of IoT & Data Analytics, which will help in employment and Entrepreneur development of the qualifier. Purpose: ❖ The purpose of the program is to develop the skills required to implement an Internet of Things system and the integration of IoT solutions with analytics tools, which will allow to analyse the IoT data being collected by the fleet of devices. ❖ Qualification is a short-term course
5	Body/bodies which will award the qualification	National Institute of Electronics and Information Technology (NIELIT) NIELIT Bhawan, Plot No. 3, PSP Pocket, Sector-8, Dwarka, New Delhi-110077
6	Body which will accredit providers to offer courses leading to the qualification	NIELIT
7	Whether accreditation/affiliation norms are already in place or not, if applicable (if yes, attach a copy)	The Handbook for TP accreditation norm is available at: https://www.nielit.gov.in/content/nsqf
8	Occupation(s) to which the qualification gives access	IoT Data Analyst, IoT Streaming Analytics, Embedded Software Engineer, IoT Developer

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9	Job description of the occupation	<p>IoT Data Analyst: Analyse, interpret, and re-present IoT data and Build enhancement analytics capabilities and processes to improve decision making and data accuracy.</p> <p>IoT Steaming Analyst: Build from scratch web/cloud platform for enabling IoT and other similar use cases on streaming analytics platform.</p> <p>Embedded Software Engineer: Design and implement software of embedded devices and systems from requirements to production and commercial deployment</p> <p>IoT Developer: They create software to support specific to IoT applications. Some of the other duties of an IoT developer includes building algorithms to analyse and manage data.</p>
10	Licensing requirements	NA
11	Statutory and Regulatory requirement of the relevant sector (documentary evidence to be provided)	NA
12	Level of the qualification in the NSQF	Level 5
13	Anticipated volume of training/learning required to complete the qualification	500 Hours Theory: 200 Practical : 300
14	Indicative list of training tools required to deliver this qualification	Recommended Hardware and Software's are included in the section I of Annexure II.
15	Entry requirements and/or recommendations and minimum age	1. B.E./B. Tech in Electronics/ Electronics & Communication/ Electrical/ Electrical and Electronics/Instrumentation/ Electronics & Instrumentation / Instrumentation & Control /Biomedical /Computer Science/Information Technology or MSc in Electronics/ Instrumentation/ Computer Science/Information Technology

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		<p>Or</p> <p>B.E/B.Tech/MSc in streams other than mentioned above and qualifiers with any other equivalent qualifications will be selected through a screening test.</p> <p>Or</p> <p>Diploma in Electronics/ Electronics & Communication/ Electrical/ Electrical and Electronics/Instrumentation/ Electronics & Instrumentation / Instrumentation & Control /Biomedical /Computer Science/Information Technology + 2 Years of Experience in IoT Domain</p> <p>2. Minimum Age: 20</p>
16	<p>Progression from the qualification (Please show Professional and academic progression)</p>	<p>Professional: IoT Data Analyst ->Team Lead (IoT Analyst)->Project Manager (IoT Analyst)</p> <p>Academic: i) Horizontal Progression: Courses in the area of Embedded System Design, Bare-metal Programming using Embedded C etc.</p> <p>ii) Vertical Progression: After completion of this course, students can go for higher studies in the area of IoT & Data Science.</p>
17	<p>Arrangements for the Recognition of Prior learning (RPL)</p>	<p>Candidates having qualification mentioned in the entry requirement and having 2 years of experience in IT may apply directly for assessment and certification.</p>
18	<p>International comparability Where known (research evidence to be provided)</p>	<p>NA</p>
19	<p>Date of planned review of the Qualification.</p>	<p>After Every 5 years</p>

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20	Formal structure of qualification
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Module Code	Module Name	Mandatory/Optional	Estimated Size (Learning Hours)	Level
ST401	Introduction to IoT & Python Programming	Mandatory	70	5
ST402	Programming with MCU	Mandatory	50	5
ST403	IoT Network & Wireless Communication	Mandatory	55	5
ST404	IoT GUI Development & Cloud Services	Mandatory	70	5
ST405	Statistical Concepts	Mandatory	35	5
ST406	Data Analytics	Mandatory	50	5
ST407	Machine Learning	Mandatory	55	5
ST408	Project	Mandatory	115	5

Detail Curriculum attached at **Annexure II**.

SECTION 1

ASSESSMENT

21	Body/Bodies which will carry out assessment: The Examination Section National Institute of Electronics and Information Technology NIELIT Bhawan, Plot No. 3, PSP Pocket, Sector-8, Dwarka, New Delhi-110077
22	How will RPL assessment be managed and who will carry it out? Candidates having qualification mentioned in the entry requirement and having 2 years of experience in IT may apply directly for assessment and certification.

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23	<p>Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, reliable and fair and show that these are in line with the requirements of the NSQF.</p> <p>The emphasis is on practical demonstration of skills & knowledge based on the performance criteria. Student is required to pass in all OUTCOMES individually and marks are allotted.</p> <p>The Following assessment methodologies are used.</p> <ul style="list-style-type: none">A. Written Assessment (Multiple Choice Questions)B. Practical Assessment & AssignmentsC. Mini Project <p>The assessment results are backed by following evidences.</p> <ol style="list-style-type: none">1. The assessor collects a copy of the attendance for the training done under the scheme. The attendance sheets are signed and stamped by the course coordinator of the Training Centre.2. The assessor verifies the authenticity of the candidate by checking the photo ID card issued by the institute as well as any one Photo ID card issued by the Central/Government. The same is mentioned in the attendance sheet.3. The assessor assigns roll number.4. The assessor takes signature of all the students along with the assessor in a prescribed attendance sheet.
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24. ASSESSMENT EVIDENCE

Title of Unit/Component:

Outcomes to be assessed	Assessment Criteria for the outcome	Means of Assessment	
		Theory	Written
1. Python Programming Skills	Understand the evolution of IoT, reference architecture, building block and challenges	15	0
	Develop problem solving capability using python scripts	10	12

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Required for IoT	Total	25	12
2. Programming with ARM Microcontroller	Acquire Knowledge of ARM Architectural Concepts	15	0
	Interfacing Peripherals with ARM Microcontrollers using SPI/I2C & CAN	10	12
	Total	25	12
3. Acquire skill in Network & Wireless Communication	Acquire the knowledge of IoT layer protocols, standards and topology	15	0
	Simulate networking protocols for wired and wireless networks.	10	15
	Total	25	15
4. GUI Development Skill & Cloud Services Management	Able to develop the applications for edge devices	15	0
	Able to integrate with the different Types of Cloud Services	10	15
	Total	25	15
5. Understanding of Statistical Concepts	Able to Understand the mathematical principles required for Data Analytics and Machine Learning.	30	12
	Total	30	12
6. Acquiring Skills on Data Analytics	Able to use NumPy for Numerical Data	5	2
	Able to use Pandas for Data Analysis.	20	5

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	Able to use Data Visualization tools for interactive dynamic visualizations	10	5
	Total	35	12
7. Acquiring Skills on Machine Learning	Able to Implement the various Machine learning algorithm using scikit-learn library on Python	35	12
	Total	35	12
Total Marks (Theory, Practical)		200	90
Theory + Practical		290	
Internal Assessment		50	
Assignment		60	
Major Project		100	
Total Marks		500	

Means of assessment

S. No	Examination Pattern	Modules Covered	Duration in Minutes	Maximum Marks
1	Theory 1 - IoT	1-4	90	100
2	Theory 2 - Data Analytics	5-7	90	100
3	Practical - IoT Edge Analytics	1-7	180	90
4	Internal Assessment	1-7	-	50
5	Assignment	1-7	-	60
6	Project/Presentation	1-7	-	100
Total				500

Theory Papers:

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1. IoT
2. Data Analytics

Practical Papers:

1. IoT Edge Analytics

Note:

1. Pass percentage would be 50% marks in each component, with aggregate pass percentage of 50% and above.
2. Grading will be as under:

Grade	S	A	B	C	D
Marks Range (in %)	$\geq 85\%$	$\geq 75\%$ and $< 85\%$	$\geq 65\%$ and $< 75\%$	$\geq 55\%$ and $< 65\%$	$\geq 50\%$ and $< 55\%$

3. Theory examination would be conducted online and the paper comprise of MCQ and each question will carry 1 mark.
4. Practical examination/Internal Assessment/ Project/Presentation/Assignment would be evaluated internally.
5. Major Project/Dissertation would be evaluated preferably by External / Subject Expert including NIELIT Officials.
6. Candidate may apply for re-examination within the validity of registration.
7. The examinations would be conducted in English Language only.

SECTION 2

25. EVIDENCE OF LEVEL

Title : Certified IoT Data Analyst			Level : 6
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF Level Descriptors	NSQF Level
Process required	Implement IoT Architecture based system. Use Concept of IoT layer protocols, standards and topology in details and simulate them for wired as well as wireless scenario.	Demands a wide range of specialized technical skill, clarity of knowledge and practice in broad range of activity involving standard and non-standard practices.	5

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Professional knowledge	Acquire Knowledge of ARM Architectural Concepts, IoT layer protocols, standards, topology and relevant statistical knowledge for data analytics.	Factual and theoretical knowledge in broad contexts within a field of work or study.	5
Professional skill	Ability to design and develop hardware and software systems as per the requirement of the application for solving real life problems.	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study.	5
Core skill	Ability to independently develop the logic required for performing analytics on edge devices. Ability to collect data from deployed sensors, ensure the data flow from IoT Data sensors to the cloud and analyses it at the cloud/mobile devices. Good communication skills in identifying sources of data, as well as new methods of data collection, analysis, and reporting.	Reasonably good in mathematical calculation, understanding of social, political and reasonably good in data collecting organizing information, and logical communication.	6
Responsibility	Ability to manage the system resources in the most effective manner by appropriate planning, estimation, coordination and control of the activities involved in the design & development of any product /project	Responsibility for own work and learning and full responsibility for other's works and learning.	6

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SECTION 3

EVIDENCE OF NEED

26	<p>What evidence is there that the qualification is needed?</p> <p>This course has been designed meet the increasing manpower requirements in IoT & Data science industry after discussion with our alumni working in various Top Industries across in India and also various reports, survey from Industry bodies, government think tank were referred.</p> <ul style="list-style-type: none">a) Edge Analytics in 2021: What it is, Why it matters & Use Cases - https://research.aimultiple.com/edge-analytics/b) IoT Edge Computing Requirements - https://www.gsma.com/iot/wp-content/uploads/2019/08/IoT-requirements-report-August-2019-1.pdfc) NASSCOM Reskilling Series: The Journey of CGI-2020 - https://futureskills.nasscom.in/research.htmld) Market Survey – https://www.grandviewresearch.com/industry-analysis/machine-learning-markete) IET Skills and Demand in Industry 2019 Survey- https://www.theiet.org/media/4812/skills-survey2019.pdff) Towards a Reskilling Revolution-World Economic Forum-2019 - http://www3.weforum.org/docs/WEF_FOW_Reskilling_Revolution.pdfg) Evidence of Requirement in the Industry https://insidebigdata.com/2020/12/21/big-data-industry-predictions-for-2021/h) Evidence of Requirement in the Industry https://www.newgenapps.com/blog/how-machine-learning-is-changing-the-it-industry/
27	<p>What is the estimated uptake of this qualification and what is the basis of this estimate?</p> <p>Estimated uptake is 25 students / Batch / centre with 2 Batches / Year and on the basis of Facilities and Infrastructure in respective NIELIT Centre. Program may also run using Virtual Lab setup for cloud software's and remote access facility available with NIELIT Chennai.</p>
28	<p>What steps were taken to ensure that the qualification(s) does (do) not duplicate already existing or planned qualifications in the NSQF? Give justification for presenting a duplicate qualification</p> <p>Similar Qualification does not exist as per information available in NQR portal.</p>

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29	What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated? Specify the review process here Based on feedback by participants, employers and based on market survey the qualification will be reviewed in every 5 years.
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SECTION 4

EVIDENCE OF PROGRESSION

30	What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector? This qualification has been designed in consultation with industry and domain expert keeping in mind today's need. Evaluation criteria have been added to ensure progression to related path ways identified as per career path.
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SECTION 5

EVIDENCE OF INTERNATIONAL COMPARABILITY

List any Comparisons which have been established

1. Coursera - AWS IoT: Developing and Deploying an Internet of Things

- Amazon Web Services

(Source: <https://www.coursera.org/lecture/aws-iot-developing-and-deploying-an-internet-of-things/iot-analytics-part-1-p5qoe>)

2. Course : Data-Driven IoT/Edge Computing

- University of Pennsylvania

(Source: <https://www.cis.upenn.edu/~lee/20cis640/>)