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	:	Dr. Munivel E
Position in the organization	:	Scientist 'D'
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List of documents submitted in support of the Qualifications File

1. Annexure I – Evidence of Job/Requirement in industry
2. Annexure II – Detailed Course Curriculum
3. Annexure III – Industry Validation

SUMMARY

1	**Qualification Title**	Certified Cloud Computing Engineer
2	**Qualification Code, if any**	NIELIT/IT/L8/027 Sector: IT
3	**NCO code and occupation**	2511.9900
4	**Nature and purpose of the qualification (Please specify whether qualification is short term or long term)**	**Nature:** ❖ This Course which will help in employment. **Purpose:** ❖ The purpose of this qualification is to train the students to be ready for Cloud Engineer Job.
5	**Body/bodies which will award the qualification**	National Institute of Electronics and Information Technology 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)**	NA
8	**Occupation(s) to which the qualification gives access**	Cloud Engineer
9	**Job description of the occupation**	Design and Deploy different Cloud Server
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	840 hrs Theory: 340 hrs Practical: 500 hrs
14	Indicative list of training tools required to deliver this qualification	Windows Server 2016/2019, RHEL (CentsOS) 7/8, Bash, Apache, bind, postfix, dovecot, mysql, PGP, openssl, Wireshark, Squid, Dansguardian, Nessus, OpenVAS, NagiOS, VMWare Workstation, VirtualBox, KVM, Xen, Docker, Citrix Hypervisor, vSphere, AWS and recommended Cloud Platform
15	Entry requirements and/or recommendations and minimum age	BE / BTech, BCA, BSc (IT / Computer Science / Electronics) or equivalent of any of these.
16	Progression from the qualification (Please show Professional and academic progression)	**Professional:** Cloud Engineer –> Senior Cloud Engineer –> Cloud Architect **Academic:** Amazon web service (AWS) certification
17	Arrangements for the Recognition of Prior learning (RPL)	Presently only candidates who undergo training shall be assessed. It will be incorporated once RPL strategy is finalized
18	International comparability Where known (research evidence to be provided)	NA
19	Date of planned review of the Qualification.	After Every 5 years
20	Formal structure of qualification	

Module Code	Module Name	Mandatory/ Optional	Estimated Size (Learning Hours)	Level
IS801	Introduction to Network Management	Mandatory	70	5
IS802	Introduction to Windows & Linux Server	Mandatory	105	5

IS803	Advance Linux Server	Mandatory	105	5
IS804	Virtualization	Mandatory	105	5
IS805	Cloud Computing	Mandatory	70	5
IS806	Cloud Infrastructure	Mandatory	105	5
IS807	Cloud Security	Mandatory	70	5
IS808	Project Work	Mandatory	210	5

Detailed Curriculum attached at **Annexure II.**

SECTION 1

ASSESSMENT

21	**Body/Bodies which will carry out assessment:** The Examination Wing, 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?** RPL Policy will be described as and when available
23	**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.** 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. Following assessment methodologies are used. The Following assessment methodologies are used. A. Written Assessment (Multiple Choice Questions)

B. Practical Assessment &Lab Performance

C. Mini Project

The assessment results are backed by following evidences.

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.

ASSESSMENT EVIDENCE

24. Title of Unit/Component:

Outcomes to be assessed	Assessment Criteria for the outcome	Means of Assessment		
		Total Marks	Written	Practical
Managing Computer Networks	1. Understands Networking Fundamental analysis using Wireshark 2. Know the methods of network cabling and testing	50	25	25
Managing Operating System Administration in Windows Server and Linux	1. Knows the configuration methods of Windows Server administration 2. Use configuration methods of Linux Server administration and testing commands.	50	25	25
Deploy Different Linux Services Like DNS, Web, Mail and File Server.	1. To configure different Linux services 2. To configure securing different Linux services.	90	50	40
Contribution of Managing Virtualization Servers	1. Execute configuration reviews for full Virtualization server deployment 2. Execute configuration reviews for Para Virtualization server deployment 3. Testing of Dockers and Containers	75	50	25
Deploy Different Types of SaaS and PaaS Cloud Servers	1. Carry out understanding of Cloud Types 2. Configuration methods of SaaS Deployment 3. Configuration methods and testing of PaaS Deployment	70	50	20
Deploy Different Types of IaaS Cloud Servers	1. Explain types of IaaS cloud 2. Testing and deployment of XenServer 3. Testing and deployment of vSphere 4. Testing and deployment of AWS Services	75	50	25

Information Security to Cloud Servers Concepts	1. Learn and implementation of Information Security Concepts 2. Testing of Cloud Server Monitoring 3. Testing of Cloud Server Auditing	70	50	20
Project	1. Deployment of different Cloud server using different tools. 2. Preparing presentation and thesis submission.	160	NA	160
Internal Assessment		60	NA	NA
Total Marks		**700**	**300**	**340**

Means of assessment

S. No	Examination Pattern	Modules Covered	Duration in Minutes	Maximum Marks
1	Theory 1 [Network and System Administration (Windows & Linux Server)]	1, 2, 3	90	100
2	Theory 2 [Virtualization & Cloud Computing Fundamentals]	4, 5	90	100
3	Theory 3 [Cloud Computing Infrastructure and Security]	6, 7	90	100
4	Practical 1 [Advance Linux Server]	1,2,3	180	90
5	Practical 2 [Cloud Infrastructure]	4,5,6,7	180	90
6	Internal Assessment	2,3,4,5,6,7	-	60
7	Project/Presentation /Assignment	2,3,4,5,6,7	-	60
8	Major Project/Dissertation	2,3,4,5,6,7	-	100
	Total			**700**

Theory Papers:

1. Network and System Administration (Windows & Linux Server)
2. Virtualization & Cloud Computing Fundamentals
3. Cloud Computing Infrastructure and Security

Practical Papers:

1. Advance Linux Server
2. Cloud Infrastructure

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 %)	>=85%	>=75% and <85%	>=65% and <75%	>=55% and <65%	>=50% and <55%

3. Theory examination would be conducted online and the paper comprise of MCQ and each question will carry 1 marks.
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 Cloud Computing Engineer			Level : 5
NSQF Domain	Outcomes of the Qualification/Component	How the job role relates to the NSQF Level Descriptors	NSQF Level

Process required,	Individuals at this job role are required to have the knowledge to develop cloud computing deployment strategy or deployment plans, based on the requirement of the organization.	Individuals at this job are responsible for Network Analysis and Management, Windows and Linux Server Administration, Bash and Python programming, Vitalization concepts, Deploying SaaS, PaaS and different IaaS and working with AWS public Cloud. Deploying different security servers in virtual environment, auditing and monitoring	5
Professional knowledge	Individuals needs to have comprehensive, cognitive, theoretical knowledge and practical skills to deploy different types of cloud servers. Tasks also include creating technical documents such as installation manual, technical report and status monitoring and auditing reports.	Private Cloud and working with AWS public Cloud. Deploying different security servers in virtual environment, auditing and monitoring the servers and networking devices using virtual appliances.	5
Professional skill	Individuals should undertake self-study, demonstrate intellectual independence, analytical rigor and good communication, to liaise with management and technical staff; and work within the internal processes, guidelines and framework of the cloud deployment. The job also involves going through many reports, analyzing and interpreting data, creating reports and manuals. He/she should have	The individual should be a problem solver in Operating Systems and Networking technologies and different cloud servers and security server deployments using open source tools.	5

	the knowledge of the company/organization and its processes. He should know & understand: ● Method to carry out cloud deployment and how to contact them ● organization's policies and procedures for recording information, maintaining information security and protecting data and the importance of compliance.		
Core skill	Individuals at this job role are responsible for developing cloud computing deployment strategy, this includes cloud adoption or deployment plans, cloud application design, and cloud management and monitoring based on the requirement of the organization.	The individual should be a problem solver in Operating Systems and Networking technologies and different cloud servers and security server deployments using open source tools.	**5**
Responsibility	They need to liaise with management and technical staff; and work within the internal processes, guidelines and framework of the cloud deployment. The job also involves going through many reports, analyzing and interpreting data, creating reports and manuals. Individual should have advanced knowledge and expertise in cloud Computing area with good understanding of and commitment to the service environment.	The individual should have the ability to undertake independent work and He/she is responsible for his/her own work, learning & development & also for others.	**5**

SECTION 3

EVIDENCE OF NEED

26	**What evidence is there that the qualification is needed?**
	This course has been designed meet the increasing manpower requirements in Cloud Computing industry after analyzing with IT industry requirement with reference to following evidences.

    a) "1 million new cloud computing jobs to be created by 2022 in India", https://www.expresscomputer.in/news/1-million-new-cloud-computing-jobs-to-be-created-by-2022-in-india/30367/, Nov, 2018.

    b) "The opportunities Industry 4.0 opens up for Indian startups", https://yourstory.com/2021/05/industry-4-opportunities-indian-startups-technology-manufacturing/amp, May, 2021.

    c) "India Data Center Market Investment Analysis and Growth Opportunities Report 2021-2026", https://www.businesswire.com/news/home/20210525005519/en/India-Data-Center-Market-Investment-Analysis-and-Growth-

1 million new cloud computing jobs to be created by 2022 in India

Qualified Cloud professionals earn 40% more than average market salaries for IT professionals

EC By Express Computer — On Nov 26, 2018   NEWS CLOUD REPORT

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Great Learning, an ed-tech platform for executives, came out with a report which states that over a million cloud computing jobs will be created in India by 2022. That said, the industry suffers with acute shortage of talent with more than 1.7 million cloud jobs worldwide remaining vacant due to shortage of talent. According to IDC, there is only one qualified candidate for 100 job postings in cloud computing across the globe. The

Opportunities-Report-2021-2026---ResearchAndMarkets.com, May, 2021.

27	**What is the estimated uptake of this qualification and what is the basis of this estimate?** Estimated uptake is 50 students / Batch with 2 Batches / Year and on the basis of Facilities and Infrastructure in NIELIT.
28	**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** The Qualification does not exist as per the information available in public domain.
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.

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 course structure is designed in such a way that, the qualification acquired will meet the prerequisites of higher level courses in Cloud Computing and its allied area like AWS Cloud Certification or other Cloud Computing certifications.