NSDA Reference
To be added by NSDA

Revised Application Documentation: Version 4 /22 August, 2016

QUALIFICATION FILE – Certificate Course

Name and address of submitting body:

- NIELIT Gorakhpur,
  M.M.M.U.T. Campus, Deoria Road Gorakhpur – 273010 (UP)
  Phone No.: 0551-2273371
  Branch Office
- NIELIT Lucknow
  A-1/9, Sumit Complex, VibhutiKhand, Gomti Nagar, Lucknow- 226010(UP)
  Phone No.: 0522 272 0590

Name and contact details of individual dealing with the submission

Name: C. Mohan

Position in the organisation Joint Director (Technical)

Address if different from above NIELIT Gorakhpur

Tel number(s) 0551-2273872

E-mail address mohan@nielit.gov.in

List of documents submitted in support of the Qualifications File

1. Detailed Curriculum(Annexure I)
2. Industry Validation(Annexure II)

   Since the proposed jobrole has not been identified by SSC, the industry mapping will be as per progression pathways indicated in the QF

QUALIFICATION FILE SUMMARY

Qualification Title	Certificate course in reliability
Qualification Code	
Body/bodies which will assess candidates	**Examination Cell,** National Institute of Electronics and Information Technology 6-CGO Complex, Electronics Niketan Lodhi Road, New Delhi. 110003.
Body/bodies which will award the certificate for the qualification.	**Certification Division,** National Institute of Electronics and Information Technology 6-CGO Complex, Electronics Niketan Lodhi Road, New Delhi. 110003.
Body which will accredit providers to offer the qualification.	**Accreditation Division,** National Institute of Electronics and Information Technology 6-CGO Complex, Electronics Niketan Lodhi Road, New Delhi. 110003.
Occupation(s) to which the qualification gives access	Reliability Engineer
Proposed level of the qualification in the NSQF.	6
Notional Learning Hours	3 Months (240hours).
Entry requirements / recommendations.	Persuing B.Tech
Progression from the qualification.	<u>In Academic</u> After completion of this course, students can go for course Build and sustain a strategic reliability engineering programme, Prepare control strategies that reduce risk and improve asset utilisation, Establish a root cause analysis programme that will minimise down time, increase production and create a culture of continuous improvement. <u>Professional</u> Initially, candidate can work as reliability engineer whose role would be to ensure the reliability and maintainability of new and modified installations and also he is responsible for adhering to the life cycle asset management. Later on, they can be work as a **project manager** in establishing statistical sound, efficient and comprehensive maintenance reliability tracking system for critical centred

	maintenance program, advocates benefits to reliability practices and fosters integration into plant operations.
Planned arrangements for RPL.	• It will be incorporated once RPL strategy is finalized. • Presently only candidates who undergo training shall be assessed

Formal structure of the qualification

Title of unit or other component (include any identification code used)	**Mandatory/ Optional**	**Estimated size (learning hours)**	**Level**
(i) Introduction to Reliability Engineering	Mandatory	20	6
(ii) Probability and Statistics for Reliability	Mandatory	40	
(iii) Reliability modelling	Mandatory	40	
(iv)Maintainability and availability	Mandatory	30	
(v) Reliability prediction	Mandatory	30	
(vi) Derating	Mandatory	30	
(vii) Fault free analysis	Mandatory	50	

SECTION 1
ASSESSMENT

Name of assessment body:
Examination Cell,
National Institute of Electronics and Information Technology
6-CGO Complex, Electronics Niketan
Lodhi Road, New Delhi. 110003.

Will the assessment body be responsible for RPL assessment?

Give details of how RPL assessment for the qualification will be carried out and quality assured.

Presently only candidates undergoing training shall be assessed. Later on candidates having experience and knowledge shall be assessed. The information will be provided on finalization of such procedure.

Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, consistent 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. Each OUTCOME is assessed & marked separately. Student is required to pass in all OUTCOMEs individually and marks are allotted. Following assessment methodologies are used.

A. Written Assessment (Multiple Choice Questions)
B. Practical Assessment
C. Viva Voce Assessment

Supporting evidences for Assessment

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 In charge / Head 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 photograph of all the students along with the assessor standing in the middle and with the centre name/banner at the back as evidence.

Please attach any documents giving further information about assessment and/or RPL.

ASSESSMENT EVIDENCE

Complete the following grid for each grouping of NOS, assessment unit or other component as listed in the entry on the structure of the qualification on page 1.

Job Role **Reliability Engineer**

Title of Unit/Component:

(Detailed Curriculum attached As Annexure-I)

Assessable Outcomes	Assessment criteria for the outcome	Total Mark	Written	Practical/ Term Work	Viva
1. Basic Concept of Reliability Engineering	Explain basic parameters of reliability	**100**	25	15	10
	Explain the Terms and definition of reliability		25	15	10
		Total	**50**	**30**	**20**
2.Demonstrate Probability and Statistics for Reliability	Probability Analysis of Data and Characteristic determination	**100**	25	15	10
	Life Data Reliability Analysis Demonstration of probability and Statistics for Reliability		25	15	10
		Total	**50**	**30**	**20**
3.Apply Reliability modeling	Explain concept of Reliability modeling	**100**	25	15	10
	Manage to Build a new modeling process		25	15	10
		Total	**50**	**30**	**20**
4. Acquire knowledge to maintain the products	Demonstarte the concepts of Maintainability and availability	**100**	50	30	20
5.Develop Concept of Reliability prediction	Analysis of Reliability Prediction	**100**	25	15	10
	Detection of failure rates, repairable and non-repairable items, failure patterns and its redundancy		25	15	10
		Total	**50**	**30**	**20**
6.Develop Concept of Derating	Apply need for derating and derating for power dissipation	**100**	**50**	**30**	**20**
7.Knowledge of Fault tree analysis	Concepts and elements of fault tree	**100**	25	15	10
	Execution of fault tree evaluation technique		25	15	10

		Total	**50**	**30**	**20**
	Grand Total	**700**	**350**	**200**	**140**

Means of assessment 1

The theory examination for each module would be for duration of three hours and the total marks for each subject would be 100. Practical and viva examination of three hours duration and 50marks. Laboratory/ Practical work will be conducted at Institutions / organizations, which are running the course. The Society will be responsible for holding the examination for theory and practical both for the students from Accredited Centres and student at large.

Pass Percentage

To qualify for a pass in a module, a candidate must have obtained at least 50% in each theory and practical examination. The marks will be translated into grades, while communicating results to the candidates. The gradation structure is as below:-

Pass percentage	**Grade**
Failed (<50)	F
50%-54%	D
55%-64%	C
65%-74%	B
75%-84%	A
85% and over	S

SECTION 2

EVIDENCE OF NEED

What evidence is there that the qualification is needed?

Reliability engineering is engineering that emphasizes dependability in the lifecycle management of a product. Dependability, or reliability, describes the ability of a system or component to function under stated conditions for a specified period of time. Reliability may also describe the ability to function at a specified moment or interval of time (Availability). Reliability engineering represents a sub-discipline within systems engineering. **Reliability** is theoretically defined as the probability of success, as the frequency of failures; or in terms of availability, as a probability derived from reliability, testability and maintainability. Testability, Maintainability and maintenance are often defined as a part of "reliability engineering" in Reliability Programs. Reliability plays a key role in the cost-effectiveness of systems.

Reliability engineering deals with the estimation, prevention and management of high levels of "lifetime" engineering uncertainty and risks of failure.

Although stochastic parameters define and affect reliability, according to some expert authors on reliability engineering, reliability is not (solely) achieved by mathematics and statistics. You cannot really find a root cause (needed to effectively prevent failures) by only looking at statistics. "Nearly all teaching and literature on the subject emphasize these aspects, and ignore the reality that the ranges of uncertainty involved largely invalidate quantitative methods for prediction and measurement.

Reliability engineering relates closely to safety engineering and to system safety, in that they use common methods for their analysis and may require input from each other. Reliability engineering focuses on costs of failure caused by system downtime, cost of spares, repair equipment, personnel, and cost of warranty claims. Safety engineering normally emphasizes not cost, but preserving life and nature, and therefore deals only with particular dangerous system-failure modes. High reliability (safety factor) levels also result from good engineering and from attention to detail, and almost never from only reactive failure management (reliability accounting / statistics).

What is the estimated uptake of this qualification and what is the basis of this estimate?

Student uptake from Industry

What steps were taken to ensure that the qualification(s) does/do not duplicate already existing or planned qualifications in the NSQF?

As the understanding and adoption models of QPs evolve in the industry and across its sub-sectors, we foresee consolidation of qualification packs as a natural progression. The Qualification does not exist as per information available in public domain.

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?

The Qualification is to be monitored and reviewed every two years.
The following data will be used

1. Results of assessments
2. Employer feedback will be sought post-placement
3. Student feedbacks
4. Workshops and seminar for reviewing the qualifications
5. Industry Requirements
6. Consultation/ Tie-up with Industries or Expert for review of the Curriculum.

SECTION 3
SUMMARY EVIDENCE OF LEVEL

Level of qualification: 5

Summary of Direct Evidence:Justify the NSQF level allocated to the QP by building upon the five descriptors of NSQF. Explain the reasons for allocating the level to the QP.

Generic NOS is/are linked to the overall authority attached to the job role.

Title : Reliability Engineer			**Level : 6**
NSQF Domain	**Outcomes of the Qualification/Component**	**How the job role relates to the NSQF Level Descriptors**	**NSQF Level**
Process required	Reliability Engineer carries out the job to identify requirements of industry which are helpful in meeting industry demands. Reliability Engineers acquire wide range of theoretical practical skills to provide analytic solution to industrial requirements. Their job is to prepare abstract model based on requirement to propose solution.	Job that requires well developed skill, with clear choice of procedures in familiar context.	**6**
Professional knowledge	After acquiring professional knowledge on Reliability tools and Techniques, the Reliability Engineer will be competent to identify technical requirements in terms of hardware, software and other IT related devices. They can prepare detailed design of the proposed solution for Reliability Products .	Knowledge of facts, principles, processes and general concepts, in a field of work or study.	**6**
Professional skill	They are proficient in developing solution based on detailed design and practical knowledge gained during course	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	**6**
Core skill	Reliability Engineer after acquiring skills both theoretical and practical of this level are able to work in different industries. They are able to make independent decision involved in providing solution.	Desired mathematical skill; understanding of social, political; and some skill of collecting and organizing information, communication.	**6**
Responsibility	They are able to lead team as well as work in team.	Responsibility for own work and learning and some responsibility to other's works and learning	**6**

SECTION 4

EVIDENCE OF RECOGNITION OR PROGRESSION

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 comprises both technical and analytic skills and can be linked to any qualification higher than this one, existing or to come.

BE Analytic works for all or any phase of product life cycle to improve the product reliability and meet all industry specific requirements/ compliance and also help to compete well in the market. ALACARTE and Item Software are the prominent core reliability facility available.)

Please attach any documents giving further information about any of the topics above.

SECTION 5

EVIDENCE OF INTERNATIONAL COMPARABILITY

List any comparisons which have been established.

Reliability Solutions, UK and Reliability Centre India have tied up together to provide a TOTAL solution to companies that require to improve and manage BOTH Product and Software Reliability, a service that is simply not available at this level in today's consulting market.
Martin Shaw , MD Reliability Solutions brings over 30 yrs of Hardware Reliability Experience into this new offering with Birinder Singh , of Reliability Centre India who also brings 25 yrs of experience in Reliability and Safety Planning, Management and Software Reliability Testing

Ref: http://www.reliabilitycentreindia.com/press.php"