

NSQF QUALIFICATION FILE**Approved in 25th NSQC, Dated: 25th June, 2020****CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE****Name and address of submitting body:**

Life Sciences Sector Skill Development Council

14, Palam Marg, Rear 2nd Floor, Vasant Vihar, New Delhi, PIN 110057

Phone: +91 11 41042407/ 408, E-mail: info@lsssdc.in

Name and contact details of individual dealing with the submission**Name:** Mr. Anshul Saxena**Position in the organisation:** Director- NOS Development & Curriculum Advisory**Address if different from above:**

Same as above

Tel number(s): + 91 11 41042407/ 408, +91 9650433002**E-mail address:** anshul.saxena@lsssdc.in**List of documents submitted in support of the Qualifications File**

- 1 Qualifications Pack
- 2 LSSSDC Protocol for Accreditation of Assessment Agencies and Assessment Guideline Ver 1.0.
- 3 Minutes of meeting of Governing Body
 - Composition of National Committee of NOS
- 4 NSDC Sector Skill Gap Report for Life Sciences Sector is available at <http://nsdcindia.org/sites/default/files/files/Pharmaceuticals.pdf>
- 5 Occupational Map and Career Progression Map
- 6 List of companies and Industry associations participated in the development of these qualification packs
- 7 List of QP/NOS validating companies

Model Curriculum (attached as annexure) which will include the following:

- Indicative list of tools/equipment to conduct the training
- Trainers qualification
- Lesson Plan
- Distribution of training duration into theory/practical/OJT component

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SUMMARY

1	Qualification Title	Bioinformatics Associate/Analyst
2	Qualification Code, if any	LFS/Q3904
3	NCO code and occupation	NCO-2015/2120.0501 and Bioinformatics
4	Nature and purpose of the qualification (Please specify whether qualification is short term or long term)	Short term with or without apprenticeship
5	Body/bodies which will award the qualification	Life Sciences Sector Skill Development Council
6	Body which will accredit providers to offer courses leading to the qualification	Life Sciences Sector Skill Development Council
7	Whether accreditation/affiliation norms are already in place or not , if applicable (if yes, attach a copy)	Yes, attached the copy as annexure 1
8	Occupation(s) to which the qualification gives access	Bioinformatics Associate/Analyst
9	Job description of the occupation	Bioinformatics Associate is also known as Bioinformatics Analyst or Computational Biologist. He/she creates mathematical models, develops dynamic simulations and performs pattern analysis of biological systems. The person is also responsible for the design of databases. He/she implements algorithms for data processing to identify and classify components of a biological system. The individual performs collection, storage and archival of primary data. He/she is expected to use machine learning for analysis of biological data, in consultation with Bioinformatics Scientist, researchers and other cross-functional stakeholders.
10	Licensing requirements	No
11	Statutory and Regulatory requirement of the relevant sector (documentary evidence to be provided)	Nil
12	Level of the qualification in the NSQF	4

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13	Anticipated volume of training/learning required to complete the qualification	1000 Hours
14	Indicative list of training tools required to deliver this qualification	Attached as annexure 2
15	Entry requirements and/or recommendations and minimum age	Graduate in Science subjects/ Bioinformatics/ Biotechnology or Graduate Engineer in Biotechnology/ Bioinformatics/Biomedical Engineering/ Computational Science 20 Years
16	Progression from the qualification (Please show Professional and academic progression)	Upward progression: Bioinformatics Scientist (Level 5)
17	Arrangements for the Recognition of Prior learning (RPL)	Process to award the qualification via RPL mode and detailed methodology is given in point No.22
18	International comparability Whether known (research evidence to be provided)	<p>While preparing the NOSs, a detailed secondary desk research was conducted. The European, South African and Australian NOSs were referred to. The relevant International NOSs for the job role are listed below for reference:</p> <p>UK NOS</p> <ul style="list-style-type: none"> •COGBIO-04 Develop algorithms and pipelines for the analysis of life science data •COGBIO-05 Carry out computational analysis of life science-related data •COGBIO-03 Prepare life science data for computational analysis •COGBIO-01 Store, archive and curate data from life science-related experiments •COGLS309 Make presentations in the workplace for life sciences and related industries •COGLS323 Write reports for activities in life sciences •SFHPHARM23 check documentation and materials •COGLS2 Maintain effective and efficient working relationships <p>Australia NOS</p> <ul style="list-style-type: none"> •Communicate workplace information •Participate in work teams and groups³

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	<p style="text-align: right;">South Africa NOS •Act in accordance with ethical and legal codes of pharmaceutical representation and the laws of the country</p>		
19	<p>Date of planned review of the qualification 25/06/2025</p>		
20	<p>Formal structure of the qualification</p> <p>Mandatory components</p>		
	<p>Title of component and identification Code/NOSs/Learning outcomes</p>	<p>Estimated size (learning hours)</p>	<p>Level</p>
(i)	<p>Orientation for Bioinformatics Occupation</p>	22:00	Bridge Module
(ii)	<p>LFS/N3909 Formulate a series of computer-based algorithms for data management of large repository of biological samples</p>	352:00	4
(iii)	<p>LFS/N3910 Use statistical tool and programming scripts for data mining and data transformation</p>	416:00	4
(iv)	<p>LFS/N3911 Perform Data Delivery and Reporting</p>	130:00	4
(v)	<p>SSC/N9001 Manage your work to meet requirements</p>	40:00	4
	<p>LFS/N0107 Coordinate with Supervisors and Other Cross-functional team members</p>	40:00	4
	<p>Sub Total A</p>	1000 hours	4
	<p>Optional components</p>		
	<p>Title of component and identification Code/NOSs/Learning outcomes</p>	<p>Estimated size</p>	<p>Level</p>
	NA	NA	NA
	<p>Sub Total B</p>	NA	NA

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Total (A+B)	1000	4
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SECTION 1 **ASSESSMENT**

21	<p>Body/Bodies which will carry out assessment:</p> <p>Following assessment agencies will carry out assessments:</p> <ol style="list-style-type: none">1. Induslynk Training Services Pvt. Ltd.- Mercer- Mettl , Plot Number 85, Sector 44, Gurugram, India2. Aspiring Minds Assessment Pvt. Ltd.- 323, Udyog Vihar, Phase 2, Gurugram, Haryana3. CoCubes Technologies Pvt. Ltd.- 1205-1206, 12th Floor, Welldone Tech Park, Sohna Road, Gurugram 122002, Haryana4. Glocal Thinkers Pvt. Ltd.- 3704, DLF Phase IV, Near Galleria Market, Gurugram 122002, Haryana5. Confederation of Indian Industry (CII)- Plot No. 249-F, Sector 18, Udyog Vihar, Phase-IV, Gurugram - 122015, Haryana (India)6. Life Sciences Sector Skill Development Council – 14, Palam Marg, 2nd floor Rear, Vasant Vihar, New Delhi --110057, Delhi
22	<p>How will RPL assessment be managed and who will carry it out?</p> <p>Assessment process for RPL programs (Candidates with experience in the occupation or for informally trained and employed trainees):</p> <ul style="list-style-type: none">• Every RPL batch is uploaded on Skill Development Management System (SDMS) managed by National Skill Development Corporation (NSDC). SDMS reflects the proposed date of assessment for the batch. The batch is uploaded on SDMS by RPL project implementation agency.• LSSSDC conducts Assessments via its empaneled Assessment Agencies and assigns the batch to an assessment agency pre-notified with NSQC for the job role.• Assessment agency ensures the availability of required infrastructure, tools for the assessment.

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- Assessments for RPL candidates are conducted in mode of Theory and Skill Practical on a fully digital platform.
- The authenticity of Trainee's identity and eligibility is verified by project implementation agency by verifying the ID proof documents (any document issued by GOI, such as Aadhaar Card, Driving License, Passport, election card etc.) and experience proof (industry endorsement, experience letters)
- Assessment agency collects evidences of the assessment in best possible way (videos, pictures, assessment logs etc.)
- The assessment agency after processing the results and putting them in standard format hands over to LSSSDC within 7 days from the date of assessment.
- LSSSDC validates the assessment results and announces the result on SDMS within 15 days of assessment date.
- Passed candidates are provided with qualification certificate.

Assessment tools: Assessment tools for a QP are decided based on composition of knowledge and skill in that QP. All assessments shall have at least two tools unless indicated otherwise. All assessments carry time allotment required per trainee, within which the assessment should be completed.

Theory test:

Scope – Is used to test the knowledge and conceptual component of the Qualification Pack.

Tools – Computer or tab based online or offline.

Method – The test methodology for Theory test involves a balanced approach of objective type questions, match the columns, fill in the blanks, tick the odd one out, choose the correct option, choose the best answer, True or false, Identify the object, tool or machinery, arrange in proper sequence.

Analysis – Question paper is divided in sections based on the job elements given in the NOS. Each Section intends to assess a knowledge field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee on required knowledge.

Skill Practical Test

Scope – Is used to test primarily the Skill component of the Qualification Pack. Trainee's expertise in handling and managing the tools and situation is tested.

Tools – Computer or tab based online or offline, simulations.

Method – Considering the cost of test and non-feasibility of creating a real time testing environment, LSSSDC opts for simulation based practical (wherever available) or an assessment based on stimulatory/ situational MCQs (multiple choice questions). The selected situations are based on real situations where he/she is expected to use certain required skills.

Analysis – Question paper developed for Skill Practical is divided in sections based on the job elements given in the NOS. Each Section intends to assess a knowledge field of the trainee. Thus, section wise calculation of

	<p>marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee on required Skills.</p> <p>Following assessment agencies will carry out assessments:</p> <ol style="list-style-type: none"> 1. Induslynk Training Services Pvt. Ltd.- Mercer- Mettl , Plot Number 85, Sector 44, Gurugram, India 2. Aspiring Minds Assessment Pvt. Ltd.- 323, Udyog Vihar, Phase 2, Gurugram, Haryana 3. CoCubes Technologies Pvt. Ltd.- 1205-1206, 12th Floor, Welldone Tech Park, Sohna Road, Gurugram 122002, Haryana 4. Glocal Thinkers Pvt. Ltd.- 3704, DLF Phase IV, Near Galleria Market, Gurugram 122002, Haryana 5. Confederation of Indian Industry (CII)- Plot No. 249-F, Sector 18, Udyog Vihar, Phase-IV, Gurugram - 122015, Haryana (India) 6. Life Sciences Sector Skill Development Council – 14, Palam Marg, 2nd floor Rear, Vasant Vihar, New Delhi --110057, Delhi
<p>23</p>	<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>Assessment Agencies: An assessment agency is selected based on</p> <ul style="list-style-type: none"> • Prior experience and understanding of Life Sciences or similar sector. • Experience in conducting assessments for similar job roles. • Manpower and Technical capabilities. • Geographical reach • Existing Network in the Life Sciences Sector • Agency’s internal policies to maintain Standards, Quality & professional Integrity • Agency’s policy in assessor management <p>Assessment development: The assessment development is done with close monitoring and under supervision of LSSSDC at every stage. Steps for assessment development:</p> <ul style="list-style-type: none"> • Selection of assessment tool(s) depending on the assessment criteria prescribed in that QP. • Developing blue print of the question paper, Viva, Demonstration, project monitoring report whatever are selected tools. • Development of lay-out of Question paper is such that the entire job element (covering a set of Performance Criteria) of that QP are covered. • Score per question maps with the score given in the assessment criteria and ensure a balanced distribution of question with varied level of difficulty. • QB developer SME selection: An expert from industry is selected who is called “Subject Matter Expert for question bank development”.

This SME must have 5-10 years of experience in the industry, on same job role.

- **QB developer SME** is screened and approved by LSSSDC. He is oriented by both LSSSDC and Assessment agency on – creating question Bank, level of questions, end desired outcome of the assessment.
- **QB validator SME selection:** Another expert from industry is selected who is called “Subject Matter Expert for question bank validation”. This SME also must have 5-10 years of experience in the industry, on same job role.
- **QB validator SME** is screened and approved by LSSSDC. He is oriented by LSSSDC on – process of creating question Bank used by assessment agency, need of balance distribution of difficulty level of questions, end desired outcome of the assessment and NSQF level. This SME validates each question with respect to assessment criteria and balanced difficulty level.
- ONLY upon the written confirmation of Question bank validation, the question bank is administered for assessment.

Assessor: The Assessors are engaged to conduct the practical and Viva sections of the assessments. The selection takes place as follows

- LSSSDC defines the criteria for profile of an assessor.
- Assessor is a person who is currently working in the same industry on same or higher job role and has minimum 5-7 years of relevant occupation experience.
- Based on this, Assessment agency locates the right people from the Industry and LSSSDC approves them after screening (they are screened on basis of resume and interview).
- Once selected, the assessor is trained by LSSSDC and Assessment agency on various aspects of the assessment and management of assessment, such as
 - QP and its background.
 - Training on Assessment methodology and how to use Assessment tools. Scoring system. (as per the attached assessment guide)
 - Maintain integrity at the assessment site.
 - Crisis handling and support system available for the same.
 - Scope of his authorities
 - Administrative responsibilities.
 - Required documentation of Trainee credentials, VTP credentials, mark sheet management.
 - Confidentiality management.
- Assessment agency signs the agreement letter with the Assessor.
- LSSSDC assesses the assessor and on qualification of assessment, certifies the Assessor.

Assessment process for fresh skill development programs (Short term without apprenticeship):

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- Every fresh batch is uploaded on Skill Development Management System (SDMS) managed by National Skill Development Corporation (NSDC). SDMS reflects the Start date, end date of the training and date of assessment for the batch. The batch is uploaded on SDMS by Vocational Training Centre.
- LSSSDC conducts Assessments via its empaneled Assessment Agencies and assigns the batch to an assessment agency pre-notified with NSQC for the job role.
- Assessment agency ensures the availability of required infrastructure, tools for the assessment.
- Assessments for Fresh candidates are conducted in mode of Theory and Viva for Skill Practical. Skill Viva is conducted by an Assessor.
- In case an assessor is involved in the assessment methodology, the trainees are scheduled in such a way that an assessor shall not assess more than 30 candidates in a day.
- Assessor and proctor from Assessment agency are present on the day of assessment to manage the process at assessment location.
- The assessor carry Aadhaar card and which has been pre informed to the vocational training center.
- Assessor ensures authenticity of Trainee's identity by verifying the documents (any document issued by GOI, such as Aadhar Card, Driving License, Passport, election card etc.)
- Assessor collects evidences of the assessment in best possible way (videos, pictures etc.)
- Proctor maintains the records of attendance, verified documents, and whatever other evidence of assessment as applicable.
- Assessor maintains complete confidentiality of the score, compiles the data and document and sends it to assessment agency.
- In cases where 100% digital assessment methodology is used, the above verifications and document collection and maintenance is done by the proctor.
- The assessment agency after processing the results and putting them in standard format hands over to LSSSDC within 7 days from the date of assessment.
- LSSSDC validates the assessment results and announces the result on SDMS within 15 days of assessment date.
- Passed candidates are provided with qualification certificate.

Assessment tools: Assessment tools for a QP are decided based on composition of knowledge and skill in that QP. All assessments shall have at least two tools unless indicated otherwise. All assessments carry time allotment required per trainee, within which the assessment should be completed.

Theory test:

Scope – Is used to test the knowledge and conceptual component of the Qualification Pack.

Tools – Computer or tab based online or offline.

Method – The test methodology for Theory test involves a balanced approach of objective type questions, match the columns, fill in the blanks, tick the odd one out, choose the correct option, choose the best answer, True or false, Identify the object, tool or machinery, arrange in proper sequence.

Analysis – Question paper is divided in sections based on the job elements given in the NOS. Each Section intends to assess a knowledge field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee on required knowledge.

Skill Practical Test

Scope – Is used to test primarily the Skill component of the Qualification Pack. Trainee's expertise in handling and managing the tools and situation is tested.

Tools – Computer or tab based online or offline, simulations.

Method – Considering the cost of test and non-feasibility of creating a real time testing environment, LSSSDC opts for simulation based practical (wherever available) or an assessment based on stimulatory/ situational MCQs (multiple choice questions). The selected situations are based on real situations where he/she is expected to use certain required skills.

Analysis – Question paper developed for Skill Practical is divided in sections based on the job elements given in the NOS. Each Section intends to assess a knowledge field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee on required Skills.

Project Assessment

Scope – Is used to test primarily the Skill component of the QP. Trainee's expertise in utilization of knowledge and skills in real life job scenarios

Tools – Project report.

Method – The trainee is deployed in Industry for on the job trainee or is being asked to work on a specific project (utilizing skills as per qualification pack). A project report duly endorsed by his/her project supervisor is prepared by the trainee and submitted for evaluation. The Assessor asks Direct questions open and close ended questions, situation-based questions, analytical questions, and decision-making based questions based on the project report

Analysis –Project Assessments are analysed on knowledge and skill component.

Viva

Scope – Is used to test the knowledge and understanding and breadth of awareness about the subject.

Some personality traits and generic skills (such as – promptness, sharpness, communication skills, depth of knowledge, comprehension, presentation, patience etc) can also be tested required for the QP.

Tools – Direct dialogue between assessor and Trainee.

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Method – Direct questions open and close ended questions, situation-based questions, analytical questions, and decision-making based questions. Different questions are included to test relevant PCs from the QP Analysis – Assessor is provided with spectrum of ready answers to be expected from trainee. This reduces effect of subjectivity of the assessor. Comparative quality of trainees with in a batch or different institutes can be gauged.

Assessment process for Apprenticeship linked fresh skill development programs (Short term with apprenticeship):

The assessment for the Basic Training and On the Job Training will be conducted toward the end of the OJT duration.

Assessment Process:

The assessment will be in two parts as below:

Part 1: OJT Assessment

For OJT assessment the Industry nominated assessor will be assessing the candidates based on the OJT monitoring report submitted by Industry supervisor and Viva by the Industry nominated assessor

1.1 Industry nominated assessor:

The Assessors are engaged to conduct the assessments by Industry. The selection takes place as follows

- Industry defines the criteria for profile of an assessor.
- Assessor is a person who is currently working in the same industry on same or higher job role and has minimum 5-7 years of experience.
- Once selected, the assessor is oriented by Industry using LSSSDC guidelines on various aspects of the assessment and management of assessment, such as
- QP and its background.
- Training on Assessment methodology and how to use Assessment tools. Scoring system. (as per the attached assessment guide)
- Maintain integrity at the assessment site.
- Crisis handling and support system available for the same.
- Scope of his authorities
- Administrative responsibilities.
- Required documentation of Trainee credentials, mark sheet management.
- Confidentiality management.

1.2 Assessment Tool for OJT:

1.2.1 OJT Monitoring Report:

- As in Life Sciences Sector reproducing the evidence for assessment is not feasible due to constraints like cost, confidentiality and controlled environment, every apprentice is required to record the evidences performed during the OJT and the same gets authorized by his/her supervisor.

- The evidence recording is done in a structured monitoring report, termed as OJT monitoring report.
- During the OJT, every trainee is required to fill the OJT monitoring report which is required to be signed by his/her supervisor.
- Towards the end of OJT period these reports are submitted with the HR department of company
- These duly submitted reports are then verified by an Industry nominated assessor for verification of evidence.

1.2.2 Viva:

Scope – Is used to test the knowledge and understanding and skills acquired during the OJT as well as to conform the OJT monitoring report. Some personality traits and generic skills (such as – promptness, sharpness, communication skills, depth of knowledge, comprehension, presentation, patience etc) can also be tested required for the QP.

Tools – Direct dialogue between assessor and Trainee.

Method – Direct questions open and close ended questions, situation-based questions, analytical questions, and decision-making based questions. Different questions are included to test relevant PCs from the QP

Analysis – Assessor draws a spectrum of ready answers to be expected from trainee. This reduces effect of subjectivity of the assessor. Comparative quality of trainees with in a batch or different institutes can be gauged.

1.3 Execution of OJT Assessment:

- HR department then hands over the individual OJT monitoring report with Industry nominated assessor and schedules an assessment meeting for each trainee
- Industry nominated assessor assesses each trainee based on OJT monitoring report, viva on each PC and attendance with each trainee towards the end of the OJT period.
- The OJT marks are compiled for each NOS by the Industry nominated assessor and submitted with HR department of company.
- The OJT assessment results are then sent to LSSSDC by HR department of company in a sealed envelope for compiling the assessment results.

Part 2: Basic Training Assessment

For Execution of the assessment for basic training, LSSSDC will be engaging more than one assessment agencies/ body.

2.1 Criteria of selection of assessment body/agency:

The assessment body/agency is selected on the basis of

- Prior experience and understanding of Life Sciences or similar sector.
- Experience in conducting assessments for similar job roles.
- Manpower and Technical capabilities.

- Geographical reach
- Existing Network in the Life Sciences Sector
- Agencies internal policies to maintain standards, quality & professional Integrity
- Agencies policy in assessor management

2.2 Assessment tool for Basic Training:

For the Basic training assessment, the assessment instrument development is done by the selected assessment body with close monitoring and support of LSSDC at every stage.

2.2.1 Digital Written test for knowledge assessment:

Scope – Is used to test the knowledge component of the QP.

Tools –computer or tab based online or offline.

Method – objective type questions, match the columns, fill in the blanks, tick the odd man out, choose the correct option, choose the best answer, True or false, Identify the object, tool or machinery, arrange in proper sequence, case study, scenario-based responses.

Analysis – Question paper is divided in sections. Each Section intends to assess a particular knowledge field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee.

2.2.2 Digital Written test for skill assessment:

Scope – Is used to test primarily the Skill component of the QP. Trainee's expertise in handling and managing the situation is tested.

Tools – computer or tab based online or offline questions

Method – A situation is narrated or created in the question posed to the trainee and he is asked objective type questions to select the correct reaction to the situation. The selected situations are based on real situations.

Analysis – Question paper is divided in sections. Each Section intends to assess a particular skill field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee.

2.3 Steps for assessment development:

- Selection of assessment tool(s) is done as per the assessment criteria prescribed in Qualification Pack.
- For Production/Machine operator assessment a blue print of the question paper, is part of assessment tool for basic training.
- Development of lay-out of Question paper is such that the entire PCs (Performance Criteria) of that QP are covered.

- Score per question maps with the weightage given to that PC, in the assessment criteria and the level of difficulty of the question.
- An expert from industry is selected who is called “Subject Matter Expert” (SME). This SME must have over 5-10 years of experience in the industry in same occupation.
- SME is screened and approved by LSSSDC. He is oriented by both LSSSDC and Assessment agency on – creating question Bank, level of questions, end desired outcome of the assessment.

2.4 Execution of Basic Training Assessment:

- Once LSSSDC receives the OJT assessment results, the assessment date for basic training is decided with common agreement of Industry and LSSSDC and turn is directed to an assessment body/agency.
- Assessment agency ensures the availability of required infrastructure, tools for the assessment.
- The assessment is executed in two possible ways depending on the choice of industry:

2.4.1 Tab based assessment using physical proctoring

2.4.2 Smart phone-based assessment using e-proctoring

2.4.1 Tab-based assessment using physical proctoring

- A representative from Assessment agency are present on the day of assessment to execute the assessment at venue in case of physical proctoring.
- Assessment agency representative carries an identity card and letter from the council authorising to conduct the assessment.
- Assessment agency representative ensures authenticity of Trainee’s identity by verifying the documents (any document issued by GOI, such as Ration card, Aadhaar Card, Driving Licence, Passport, election card etc)
- Assessment agency representative maintains the records of attendance, verified documents and tablet instruments used in assessment.
- Assessment agency representative collects evidences of the assessment in best possible way (videos, pictures, voice recordings etc)
- Assessment agency representative transfer the assessment scores from tab to assessment agency server, using a secure, encrypted web-based program.
- The assessment agency after processing the results and putting them in standard format hands over to LSSSDC within 7 days of assessment.

2.4.2 Smart phone-based assessment using e-proctoring

- All trainees due for assessments are registered on a assessment tool application using their unique mobile number and e-mail ID along with a Govt. ID issued proof.

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	<ul style="list-style-type: none">• An assessment link is sent to the mail ID of each trainee with a defined expiry date of the link.• Trainee at any location can click on the link using his/her smart phone or a web camera enabled computer system• Using the unique credentials and govt ID number, trainee logs in for start of assessment and completes the assessment.• Authenticity of Trainee's identity is done by assessment application by verifying the documents (any document issued by GOI, such as Ration card, Aadhaar Card, Driving Licence, Passport, election card etc.) and a live photo capture• A live video of candidate during the assessment is captured to collect the evidences of the assessment• Once the assessment is complete, the assessment application automatically assessment scores to assessment agency server, using a secure, encrypted web-based program.• The assessment agency after processing the results and putting them in standard format hands over to LSSSDC within 7 days of assessment. <p>Assessment Result compilation:</p> <ul style="list-style-type: none">• LSSSDC compiles the score submitted by assessment agency and OJT score submitted by Industry HR department.• LSSSDC cross checks and validates the data and declares the result to Industry and trainee.• Passed trainees are provided with certificate
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- LSSSDC Protocol for Accreditation of Assessment Agencies and Assessment Guideline Ver1.00 is attached as annexure 3

ASSESSMENT EVIDENCE

Compulsory NOS Total Marks: 500.00				Marks Allocation			
Assessment outcomes	Assessment Criteria for outcomes	Total Mark	Out Of	Theory	Skills Practical	Project	Viva
1. LFS/N3909 (Formulate a series of computer-based algorithms for data management of large repository of biological samples)	Implement algorithm	100	45	10	15	5	15
	PC1. refine and implement the mathematical algorithm, codes and statistical methods for the management and analysis of biological and biomedical data						
	PC2. apply statistical programming languages, mathematical modeling and computer simulations to design and implement methods for analyzing data						
	PC3. communicate the changes made in the algorithm for refinement/ customization during implementation to the development team						
						16	

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Compulsory NOS Total Marks: 500.00				Marks Allocation			
Assessment outcomes	Assessment Criteria for outcomes	Total Mark	Out Of	Theory	Skills Practical	Project	Viva
	Construct and curate a database		55	10	20	5	20
	PC4. collate, organize and annotate biological and medical data to aid its retrieval and analysis						
	PC5. develop or refine software tools that implement algorithms for analyzing biological and biomedical data						
	PC6. develop bioinformatics workflows, databases and tools						
	PC7. create and maintain database resources cataloging biological information						
	Total		100	20	35	10	35
2. LFS/N3910 (Use statistical tool and programming scripts for data mining and data transformation)	Data extraction and preparation		55	10	20	5	20
	PC1. extract biological data from databases or datasets						
	PC2. perform screening and identification using bioinformatics tools						
	PC3. explain different data sources and how to access information from data sources						
	PC4. develop scripts (short programs) for scanning or transforming large amount of data	100					17

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Compulsory NOS Total Marks: 500.00				Marks Allocation			
Assessment outcomes	Assessment Criteria for outcomes	Total Mark	Out Of	Theory	Skills Practical	Project	Viva
	PC5. match and manipulate strings through the use of regular expressions by changing file formats from one to another						
	PC6. extract sequence, parameters, and annotation from flat files by using Perl, Python or R script						
	PC7. convert raw data to platform compatible format						
	PC8. generalize FASTA format for storing biological (DNA or protein) sequences						
	PC9. utilize web applications based on appropriate program scripts like Perl on cross Operating System (OS) platform (Linux etc.)						
	PC10. check Quality Check (QC) parameters to qualify the data quality						
	PC11. check metadata of samples						
	PC12. correlate deliverables and biological inputs						
	PC13. communicate with appropriate stakeholder for any gap						
	Data mining and analysis		45	10	15	5	15

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Compulsory NOS Total Marks: 500.00				Marks Allocation			
Assessment outcomes	Assessment Criteria for outcomes	Total Mark	Out Of	Theory	Skills Practical	Project	Viva
	PC14.analyze data from databases or datasets using computational tools to derive biological or medical knowledge and insight from them						
	PC15.implement bioinformatics tools to predict structure and function of genes, proteins, drug ingredients and metabolic pathways						
	PC16.manage and organize biological data and results using databases						
	PC17.recall bioinformatics packages for R, Bio python, Bio perl, Bioconductor for variety of biological data sets, for examples array data, sequences data, graphs, protein structure data, clinical data						
	PC18.apply Big data tool to enable parallel computing and distributed programming						
	PC19.perform primary analysis for confirmatory check and pipeline qualification						
	PC20.perform secondary analysis for ascertaining						

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Compulsory NOS Total Marks: 500.00				Marks Allocation			
Assessment outcomes	Assessment Criteria for outcomes	Total Mark	Out Of	Theory	Skills Practical	Project	Viva
	biological meaning of data						
	PC21.assist Bioinformatics Data Scientist in Biological Correlation with the predefined outcome						
	PC22.assist Bioinformatics Data Scientist in publications						
	Total		100	20	35	10	35
3. LFS/N3911 (Perform Data Delivery and Reporting)	Organize and report results of analysis		100	20	35	10	35
	PC1. correlate deliverables, biological inputs, data analysis and analyzed results						
	PC2. check that the data/information in analysis report is accurate, complete and up-to-date						
	PC3. follow the technical writing rules and method to write the report	100					
	PC4. recall the end user requirement with respect to result/ outcome presentation formats						
	PC5. discuss with bioinformatics scientist and other relevant stakeholders to confirm the end user						

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Compulsory NOS				Marks Allocation			
Total Marks: 500.00							
Assessment outcomes	Assessment Criteria for outcomes	Total Mark	Out Of	Theory	Skills Practical	Project	Viva
	requirement on data visualization						
	PC6. represent and deliver the result as per the end user requirement						
	PC7. meet the turn around time(TAT)/ timelines for reporting the results						
	Total		100	20	35	10	35
4. SSC/N9001 (Manage your work to meet requirements)	Utilize resources	100					
	PC1. establish and agree work requirements with appropriate people		6.25	0	6.25	0	0
	PC2. keep immediate work area clean and tidy		12.5	6.25	6.25	0	0
	PC3. utilize time effectively		12.5	6.25	6.25	0	0
	PC4. use resources correctly and efficiently		18.75	6.25	12.5	0	0
	PC5. treat confidential information correctly		6.25	0	6.25	0	0
	Ensure compliance						
	PC6. work in line with organization's policies and procedures		12.5	0	12.5	0	0
	PC7. work within the limits of job role		6.25	0	6.25	0	0
	PC8. obtain guidance from appropriate people, where necessary		6.25	0	6.25	0	0
PC9. ensure work meets the agreed requirements	18.75	6.25	12.5	0	0		
	Total		100	25	75	0	0

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Compulsory NOS				Marks Allocation			
Total Marks: 500.00							
Assessment outcomes	Assessment Criteria for outcomes	Total Mark	Out Of	Theory	Skills Practical	Project	Viva
5. LFS/N0107 (Coordinate with Supervisors and Other Cross-functional team members)	Coordination with manager	100	40	10	15	0	15
	PC1. receive work instructions from reporting manager and understand work output requirements						
	PC2. seek advice and opinion from manager on the approach taken for carrying out work						
	PC3. report any challenges, obstacles in completing the work as per specifications and timelines						
	PC4. assist the manager with his/her responsibilities						
	Coordination with team members		40	10	15	0	15
	PC5. work as a team with colleagues and share workload						
	PC6. put team over individual goals						
	PC7. work to resolve conflicts within the team						
	Coordination with cross-functional teams		20	10	5	0	5
	PC8. articulate support/inputs/data needed from cross-functional teams						
	PC9. interact with the necessary cross-functional teams to gather the required data						

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Compulsory NOS Total Marks: 500.00				Marks Allocation			
Assessment outcomes	Assessment Criteria for outcomes	Total Mark	Out Of	Theory	Skills Practical	Project	Viva
	PC10. provide proactive support/ inputs/data requested by other teams						
	PC11. participate in cross-functional team meetings and share relevant information						
	Total		100	30	35	0	35

24. Assessment evidences

Title of Component: **LFS/N3909: Formulate a series of computer-based algorithms for data management of large repository of biological samples**

Outcomes to be assessed/NOSs to be assessed	Assessment criteria for the outcome
Implement algorithm	PC1. refine and implement the mathematical algorithm, codes and statistical methods for the management and analysis of biological and biomedical data
	PC2. apply statistical programming languages, mathematical modeling and computer simulations to design and implement methods for analyzing data
	PC3. communicate the changes made in the algorithm for refinement/ customization during implementation to the development team
Construct and curate a database	PC4. collate, organize and annotate biological and medical data to aid its retrieval and analysis
	PC5. develop or refine software tools that implement algorithms for analyzing biological and biomedical data

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	<p>PC6. develop bioinformatics workflows, databases and tools</p> <p>PC7. create and maintain database resources cataloging biological information</p>
Means of assessment 1	<p>Theory test:</p> <p><u>Scope</u> – Is used to test the knowledge and conceptual component of the Qualification Pack.</p> <p><u>Tools</u> – Computer or tab based online or offline.</p> <p><u>Method</u> – The test methodology for Theory test involves a balanced approach of objective type questions, match the columns, fill in the blanks, tick the odd one out, choose the correct option, choose the best answer, True or false, Identify the object, tool or machinery, arrange in proper sequence.</p> <p><u>Analysis</u> – Question paper is divided in sections based on the job elements given in the NOS. Each Section intends to assess a knowledge field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee on required knowledge.</p>
Means of assessment 2	<p>Skill Practical Test</p> <p><u>Scope</u> – Is used to test primarily the Skill component of the Qualification Pack. Trainee’s expertise in handling and managing the tools and situation is tested.</p> <p><u>Tools</u> – Computer or tab based online or offline, simulations.</p> <p><u>Method</u> – Considering the cost of test and non-feasibility of creating a real time testing environment, LSSDC opts for simulation based practical (wherever available) or an assessment based on stimulatory/ situational MCQs (multiple choice questions). The selected situations are based on real situations where he/she is expected to use certain required skills.</p> <p><u>Analysis</u> – Question paper developed for Skill Practical is divided in sections based on the job elements given in the NOS. Each Section intends to assess a knowledge field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee on required Skills.</p>
Means of assessment 3	<p>Project Assessment</p> <p><u>Scope</u> – Is used to test primarily the Skill component of the QP. Trainee’s expertise in utilization of knowledge and skills in real life job scenarios</p> <p><u>Tools</u> – Project report.</p> <p style="text-align: right;">24</p>

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	<p><u>Method</u> – The trainee is deployed in Industry for on the job trainee or is being asked to work on a specific project (utilizing skills as per qualification pack). A project report duly endorsed by his/her project supervisor is prepared by the trainee and submitted for evaluation. The Assessor asks Direct questions open and close ended questions, situation-based questions, analytical questions, and decision-making based questions based on the project report</p> <p><u>Analysis</u> –Project Assessments are analysed on knowledge and skill component.</p>
Means of assessment 4	<p>Viva</p> <p><u>Scope</u> – Is used to test the knowledge and understanding and breadth of awareness about the subject.</p> <p>Some personality traits and generic skills (such as – promptness, sharpness, communication skills, depth of knowledge, comprehension, presentation, patience etc) can also be tested required for the QP.</p> <p><u>Tools</u> – Direct dialogue between assessor and Trainee.</p> <p><u>Method</u> – Direct questions open and close ended questions, situation-based questions, analytical questions, and decision-making based questions. Different questions are included to test relevant PCs from the QP</p> <p><u>Analysis</u> – Assessor is provided with spectrum of ready answers to be expected from trainee. This reduces effect of subjectivity of the assessor.</p> <p>Comparative quality of trainees within a batch or different institutes can be gauged</p>
Pass/Fail	<p>The aggregate pass marks for Theory, Skill Practical, Project and Viva is 70%. In case of RPL where Project will not be there ,the aggregate pass marks for Theory, Skill Practical and Viva shall also be 70%.</p>

Title of Component: LFS/N3910: Use statistical tool and programming scripts for data mining and data transformation

Outcomes to be assessed/NOSs to be assessed	Assessment criteria for the outcome
Data extraction and preparation	PC1. extract biological data from databases or datasets
	PC2. perform screening and identification using bioinformatics tools
	PC3. explain different data sources and how to access information from data sources

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	PC4. develop scripts (short programs) for scanning or transforming large amount of data
	PC5. match and manipulate strings through the use of regular expressions by changing file formats from one to another
	PC6. extract sequence, parameters, and annotation from flat files by using Perl, Python or R script
	PC7. convert raw data to platform compatible format
	PC8. generalize FASTA format for storing biological (DNA or protein) sequences
	PC9. utilize web applications based on appropriate program scripts like Perl on cross Operating System (OS) platform (Linux etc.)
	PC10. check Quality Check (QC) parameters to qualify the data quality
	PC11. check metadata of samples
	PC12. correlate deliverables and biological inputs
	PC13. communicate with appropriate stakeholder for any gap
Data mining and analysis	PC14. analyze data from databases or datasets using computational tools to derive biological or medical knowledge and insight from them
	PC15. implement bioinformatics tools to predict structure and function of genes, proteins, drug ingredients and metabolic pathways
	PC16. manage and organize biological data and results using databases
	PC17. recall bioinformatics packages for R, Bio python, Bio perl, Bioconductor for variety of biological data sets, for examples array data, sequences data, graphs, protein structure data, clinical data
	PC18. apply Big data tool to enable parallel computing and distributed programming
	PC19. perform primary analysis for confirmatory check and pipeline qualification
	PC20. perform secondary analysis for ascertaining biological meaning of data
	PC21. assist Bioinformatics Data Scientist in Biological Correlation with the predefined outcome
	PC22. assist Bioinformatics Data Scientist in publications
Means of assessment 1	<p>Theory test: <u>Scope</u> – Is used to test the knowledge and conceptual component of the Qualification Pack. <u>Tools</u> – Computer or tab based online or offline. <u>Method</u> – The test methodology for Theory test involves a balanced approach of objective type</p>

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	<p>questions, match the columns, fill in the blanks, tick the odd one out, choose the correct option, choose the best answer, True or false, Identify the object, tool or machinery, arrange in proper sequence.</p> <p><u>Analysis</u> – Question paper is divided in sections based on the job elements given in the NOS. Each Section intends to assess a knowledge field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee on required knowledge.</p>
<p>Means of assessment 2</p>	<p>Skill Practical Test</p> <p><u>Scope</u> – Is used to test primarily the Skill component of the Qualification Pack. Trainee’s expertise in handling and managing the tools and situation is tested.</p> <p><u>Tools</u>– Computer or tab based online or offline, simulations.</p> <p><u>Method</u> – Considering the cost of test and non-feasibility of creating a real time testing environment, LSSSDC opts for simulation based practical (wherever available) or an assessment based on stimulatory/ situational MCQs (multiple choice questions). The selected situations are based on real situations where he/she is expected to use certain required skills.</p> <p><u>Analysis</u> – Question paper developed for Skill Practical is divided in sections based on the job elements given in the NOS. Each Section intends to assess a knowledge field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee on required Skills.</p>
<p>Means of assessment 3</p>	<p>Project Assessment</p> <p><u>Scope</u> – Is used to test primarily the Skill component of the QP. Trainee’s expertise in utilization of knowledge and skills in real life job scenarios</p> <p><u>Tools</u>– Project report.</p> <p><u>Method</u> – The trainee is deployed in Industry for on the job trainee or is being asked to work on a specific project (utilizing skills as per qualification pack). A project report duly endorsed by his/her project supervisor is prepared by the trainee and submitted for evaluation. The Assessor asks Direct questions open and close ended questions, situation-based questions, analytical questions, and decision-making based questions based on the project report</p>

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	<p><u>Analysis</u> –Project Assessments are analysed on knowledge and skill component.</p>
Means of assessment 4	<p>Viva <u>Scope</u> – Is used to test the knowledge and understanding and breadth of awareness about the subject. Some personality traits and generic skills (such as – promptness, sharpness, communication skills, depth of knowledge, comprehension, presentation, patience etc) can also be tested required for the QP. <u>Tools</u> – Direct dialogue between assessor and Trainee. <u>Method</u> – Direct questions open and close ended questions, situation-based questions, analytical questions, and decision-making based questions. Different questions are included to test relevant PCs from the QP <u>Analysis</u> – Assessor is provided with spectrum of ready answers to be expected from trainee. This reduces effect of subjectivity of the assessor. Comparative quality of trainees with in a batch or different institutes can be gauged</p>
Pass/Fail	<p>The aggregate pass marks for Theory, Skill Practical, Project and Viva is 70%. In case of RPL where Project will not be there ,the aggregate pass marks for Theory, Skill Practical and Viva shall also be 70%.</p>

Title of Component: LFS/N3911: Perform Data Delivery and Reporting

Outcomes to be assessed/NOSs to be assessed	Assessment criteria for the outcome
Organize and report results of analysis	PC1. correlate deliverables, biological inputs, data analysis and analysed results
	PC2. check that the data/information in analysis report is accurate, complete and up-to-date
	PC3. follow the technical writing rules and method to write the report
	PC4. recall the end user requirement with respect to result/ outcome presentation formats
	PC5. discuss with bioinformatics scientist and other relevant stakeholders to confirm the end user requirement on data visualization
	PC6. represent and deliver the result as per the end user requirement
	PC7. meet the turn around time(TAT)/ timelines for reporting the results

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<p>Means of assessment 1</p>	<p>Theory test: <u>Scope</u> – Is used to test the knowledge and conceptual component of the Qualification Pack. <u>Tools</u> – Computer or tab based online or offline. <u>Method</u> – The test methodology for Theory test involves a balanced approach of objective type questions, match the columns, fill in the blanks, tick the odd one out, choose the correct option, choose the best answer, True or false, Identify the object, tool or machinery, arrange in proper sequence. <u>Analysis</u> – Question paper is divided in sections based on the job elements given in the NOS. Each Section intends to assess a knowledge field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee on required knowledge.</p>
<p>Means of assessment 2</p>	<p>Skill Practical Test <u>Scope</u> – Is used to test primarily the Skill component of the Qualification Pack. Trainee’s expertise in handling and managing the tools and situation is tested. <u>Tools</u> – Computer or tab based online or offline, simulations. <u>Method</u> – Considering the cost of test and non-feasibility of creating a real time testing environment, LSSSDC opts for simulation based practical (wherever available) or an assessment based on stimulatory/ situational MCQs (multiple choice questions). The selected situations are based on real situations where he/she is expected to use certain required skills. <u>Analysis</u> – Question paper developed for Skill Practical is divided in sections based on the job elements given in the NOS. Each Section intends to assess a knowledge field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee on required Skills.</p>
<p>Means of assessment 3</p>	<p>Project Assessment <u>Scope</u> – Is used to test primarily the Skill component of the QP. Trainee’s expertise in utilization of knowledge and skills in real life job scenarios <u>Tools</u> – Project report. <u>Method</u> – The trainee is deployed in Industry for on the job trainee or is being asked to work on a specific project (utilizing skills as per qualification pack). A project report duly endorsed by his/her project</p>

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	<p>supervisor is prepared by the trainee and submitted for evaluation. The Assessor asks Direct questions open and close ended questions, situation-based questions, analytical questions, and decision-making based questions based on the project report</p> <p><u>Analysis</u> –Project Assessments are analysed on knowledge and skill component.</p>
Means of assessment 4	<p>Viva</p> <p><u>Scope</u> – Is used to test the knowledge and understanding and breadth of awareness about the subject.</p> <p>Some personality traits and generic skills (such as – promptness, sharpness, communication skills, depth of knowledge, comprehension, presentation, patience etc) can also be tested required for the QP.</p> <p><u>Tools</u> – Direct dialogue between assessor and Trainee.</p> <p><u>Method</u> – Direct questions open and close ended questions, situation-based questions, analytical questions, and decision-making based questions. Different questions are included to test relevant PCs from the QP</p> <p><u>Analysis</u> – Assessor is provided with spectrum of ready answers to be expected from trainee. This reduces effect of subjectivity of the assessor. Comparative quality of trainees with in a batch or different institutes can be gauged</p>
Pass/Fail	<p>The aggregate pass marks for Theory, Skill Practical, Project and Viva is 70%. In case of RPL where Project will not be there ,the aggregate pass marks for Theory, Skill Practical and Viva shall also be 70%.</p>

Title of Component: SSC/N9001: Manage your work to meet requirements

Outcomes to be assessed/NOSs to be assessed	Assessment criteria for the outcome
Utilize resources	PC1. establish and agree your work requirements with appropriate people
	PC2. keep your immediate work area clean and tidy
	PC3. utilize your time effectively
	PC4. use resources correctly and efficiently
	PC5. treat confidential information correctly
Ensure compliance	PC6. work in line with your organization's policies and procedures
	PC7. work within the limits of your job role
	PC8. obtain guidance from appropriate people, where necessary

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	PC9. ensure your work meets the agreed requirements
Means of assessment 1	<p>Theory test:</p> <p><u>Scope</u> – Is used to test the knowledge and conceptual component of the Qualification Pack.</p> <p><u>Tools</u> – Computer or tab based online or offline.</p> <p><u>Method</u> – The test methodology for Theory test involves a balanced approach of objective type questions, match the columns, fill in the blanks, tick the odd one out, choose the correct option, choose the best answer, True or false, Identify the object, tool or machinery, arrange in proper sequence.</p> <p><u>Analysis</u> – Question paper is divided in sections based on the job elements given in the NOS. Each Section intends to assess a knowledge field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee on required knowledge.</p>
Means of assessment 2	<p>Skill Practical Test</p> <p><u>Scope</u> – Is used to test primarily the Skill component of the Qualification Pack. Trainee’s expertise in handling and managing the tools and situation is tested.</p> <p><u>Tools</u> – Computer or tab based online or offline, simulations.</p> <p><u>Method</u> – Considering the cost of test and non-feasibility of creating a real time testing environment, LSSSDC opts for simulation based practical (wherever available) or an assessment based on stimulatory/ situational MCQs (multiple choice questions). The selected situations are based on real situations where he/she is expected to use certain required skills.</p> <p><u>Analysis</u> – Question paper developed for Skill Practical is divided in sections based on the job elements given in the NOS. Each Section intends to assess a knowledge field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee on required Skills.</p>
Pass/Fail	<p>The aggregate pass marks for Theory, Skill Practical, Project and Viva is 70%. In case of RPL where Project will not be there ,the aggregate pass marks for Theory, Skill Practical and Viva shall also be 70%.</p>

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Title of Component: LFS/N0107: Coordinate with Supervisors and Other Cross-functional team members

Outcomes to be assessed/NOSs to be assessed	Assessment criteria for the outcome
Coordination with manager	PC1. receive work instructions from reporting manager and understand work output requirements
	PC2. seek advice and opinion from manager on the approach taken for carrying out work
	PC3. report any challenges, obstacles in completing the work as per specifications and timelines
	PC4. assist the manager with his/her responsibilities
Coordination with team members	PC5. work as a team with colleagues and share workload
	PC6. put team over individual goals
	PC7. work to resolve conflicts within the team
Coordination with cross functional teams	PC8. articulate support/ inputs/data needed from cross-functional teams
	PC9. interact with the necessary cross-functional teams to gather the required data
	PC10. provide proactive support/ inputs/data requested by other teams
	PC11. participate in cross-functional team meetings and share relevant information
Means of assessment 1	<p>Theory test:</p> <p><u>Scope</u> – Is used to test the knowledge and conceptual component of the Qualification Pack.</p> <p><u>Tools</u> – Computer or tab based online or offline.</p> <p><u>Method</u> – The test methodology for Theory test involves a balanced approach of objective type questions, match the columns, fill in the blanks, tick the odd one out, choose the correct option, choose the best answer, True or false, Identify the object, tool or machinery, arrange in proper sequence.</p> <p><u>Analysis</u> – Question paper is divided in sections based on the job elements given in the NOS. Each Section intends to assess a knowledge field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee on required knowledge.</p>
Means of assessment 2	<p>Skill Practical Test</p> <p><u>Scope</u> – Is used to test primarily the Skill component of the Qualification Pack. Trainee's expertise in</p>

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	<p>handling and managing the tools and situation is tested.</p> <p><u>Tools</u> – Computer or tab based online or offline, simulations.</p> <p><u>Method</u> – Considering the cost of test and non-feasibility of creating a real time testing environment, LSSSDC opts for simulation based practical (wherever available) or an assessment based on stimulatory/ situational MCQs (multiple choice questions). The selected situations are based on real situations where he/she is expected to use certain required skills.</p> <p><u>Analysis</u> – Question paper developed for Skill Practical is divided in sections based on the job elements given in the NOS. Each Section intends to assess a knowledge field of the trainee. Thus, section wise calculation of marks gives the clear idea of the areas of improvement or expertise of the trainee. While a consolidated mark gives the overall rating of the trainee on required Skills.</p>
Means of assessment 3	<p>Viva</p> <p><u>Scope</u> – Is used to test the knowledge and understanding and breadth of awareness about the subject.</p> <p>Some personality traits and generic skills (such as – promptness, sharpness, communication skills, depth of knowledge, comprehension, presentation, patience etc) can also be tested required for the QP.</p> <p><u>Tools</u> – Direct dialogue between assessor and Trainee.</p> <p><u>Method</u> – Direct questions open and close ended questions, situation-based questions, analytical questions, and decision-making based questions. Different questions are included to test relevant PCs from the QP</p> <p><u>Analysis</u> – Assessor is provided with spectrum of ready answers to be expected from trainee. This reduces effect of subjectivity of the assessor. Comparative quality of trainees with in a batch or different institutes can be gauged</p>
Pass/Fail	<p>The aggregate pass marks for Theory, Skill Practical, Project and Viva is 70%. In case of RPL where Project will not be there ,the aggregate pass marks for Theory, Skill Practical and Viva shall also be 70%.</p>

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SECTION 2

25. EVIDENCE OF LEVEL

Title/Name of the qualification/Component:			Level:
NSQF Domain	Key requirements of the job role	How the job role relates to the NSQF level descriptors	NSQF level
Process	<p>Few of the job elements, expected to be performed by Bioinformatics Associate are:</p> <ul style="list-style-type: none"> • Implement algorithm • construct and curate databases • Extract data and Prepare Data • Data mining analysis • Organize and report analysis 	<p>Bioinformatics Associate follows standard operating procedures while working on algorithm implementation, construction and curation of databases, extracting data/ data mining and preparing data for analysis. Also, he/she gets the defined formats in which they are expected to organize and report the analysis outcomes. All the above performance outcomes are routine and common in all the projects assigned to bioinformatics associate, hence are categorized as familiar and predictable processes where the bioinformatics associate has situation of clear choice.</p>	4
Professional Knowledge	<p>Few of the job elements, expected to be performed by Bioinformatics Associate are:</p> <ul style="list-style-type: none"> • Implement algorithm • construct and curate databases • Extract data and Prepare Data • Data mining analysis 	<p>To perform the tasks given in the left-hand side box, a bioinformatics associate needs to have the factual knowledge of omics field, biology science and software tools</p>	4

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	<ul style="list-style-type: none"> Organize and report analysis Ensure compliance 		
Professional Skills	<p>Few of the job elements, expected to be performed by Bioinformatics Associate are:</p> <ul style="list-style-type: none"> Implement algorithm construct and curate databases Extract data and Prepare Data Data mining analysis Organize and report analysis Ensure compliance Utilize resources Coordination with manager Coordination with team members Coordination with cross functional teams 	<p>To perform the tasks of algorithm implementation, data extraction, mining and data analysis, a bioinformatics associate utilizes the professional skills like, Analytical Skills, Critical Skills, Problem Solving, Decision Making.</p> <p>To organize and report analysis and utilization of resources, he/ she uses the planning and organizing skills as well as customer centricity</p> <p>The scope of utilization of all above professional skills remains limited to routine and repetitive and for a narrow range of applications</p>	4
Core Skills	<p>Few of the job elements, expected to be performed by Bioinformatics Associate are:</p> <ul style="list-style-type: none"> Implement algorithm construct and curate databases Extract data and Prepare Data Data mining analysis Organize and report analysis Ensure compliance Utilize resources Coordination with manager 	<p>To perform the tasks written on the left-hand side box, bioinformatics associate uses mostly English language for communication in written or oral mode.</p> <p>For implementation of algorithm and database related tasks, he/she applies basics of arithmetic and algebraic principles.</p>	4

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	<ul style="list-style-type: none">• Coordination with team members• Coordination with cross functional teams	For the purpose of coordination related tasks and ensuring compliance to organizational SOPs and client requirement, he/she is expected to have the basic understanding of social political and natural environment at the place of work/ organization he/she is working for.	
Responsibility	<p>Bioinformatics associate has the own responsibility of following:</p> <ul style="list-style-type: none">• Implement algorithm• construct and curate databases• Extract data and Prepare Data• Data mining analysis• Organize and report analysis• Ensure compliance <p>Also, he/she has a core job function as Manage your work to meet requirements</p>	Bioinformatics associate has responsibility for his/her own work and learning and doesn't has to supervise the team. And in case of scenario / situation of no clear choice he is expected to take guidance from supervisor.	4

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SECTION 3

EVIDENCE OF NEED

26 **What evidence is there that the qualification is needed? What is the industry relevance of this qualification and what is the basis of this?**

Need of the qualification

LSSSDC has prepared a skill gap report forecasting the need for this job role both on short-term and long-term basis.

Additionally, all the industries who have validated the qualification have expressed the need of this qualification considering futuristic need.

Industry Relevance

LSSSDC have taken validations of this job role from the industry employers. During validation, following companies have confirmed this qualification as relevant and required.

S.No	Name of the organization/Institution
1	Medgenome Labs Ltd.
2	Eli Lilly and Company
3	Tata Consultancy Services Ltd
4	Spinco Biotech Pvt Ltd
5	QIAGEN India Pvt. Ltd.
6	Evalueserve
7	Elucidata
8	Premas Life Sciences
9	Redcliffe life sciences
10	GeneOmbio Technologies Pvt Ltd.
11	NextGen Life Sciences Private Limited
12	Bionivid Technology Private Limited
13	GenoPhe Biotech Pvt. Ltd.
14	Bengaluru Genomics Centre Pvt. Ltd.
15	Jawaharlal Nehru University
16	Institute of Genomics and Integrative Biology
17	The Institute of Bioinformatics and Applied Biotechnology (IBAB)
18	Siddaganga Institute of Technology,
19	CHRIST (Deemed to be University)

Usage of qualification

LSSSDC would submit periodic details (directly/Via NSDC) of the employment generated (wherever applicable) and realised by virtue of training in the Qualifications post approval of NSQC and implementation of the qualification.

NSQF QUALIFICATION FILE

Approved in 25th NSQC, Dated:25th June,2020

Estimated uptake	LSSSDC has prepared a skill gap report forecasting the year wise estimated uptake. The forecasted uptake is given as annexure-4.
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27	Recommendation from the concerned Line Ministry of the Government/Regulatory Body. To be supported by documentary evidences
	We have received recommendation from Department of Biotechnology for the job role of Bioinformatics Associate/Analyst. (copy of recommendation is enclosed in annexure 5).
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 NSDC list of Approved and Under-development QPs has been checked for overlap. Standards team of NSDC has done the 2 nd level check before QRC presentation
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 Workshops with Industry Associations of Employers are part of continuous awareness drive and will be utilized as a channel to get a continual feedback from Industry. The Qualification has been uploaded on SSC website for public with a request for feedback on qualification to be sent to an identified mail address SSC will be engaged with Training Providers and Authorised educational institutions, who are imparting trainings as per QP guidelines, to gather feedback in implementation Monitoring of candidate Assessment Result will be carried out Employer feedback will be sought post placement of trainee's batch A formal review is scheduled in four-year time frame

SECTION 4

EVIDENCE OF PROGRESSION

NSQF QUALIFICATION FILE

Approved in 25th NSQC, Dated:25th june,2020

30	<p>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? <i>Show the career map here to reflect the clear progression</i></p> <p>Mobility options to other qualifications are enabled through the alignment of educational qualifications and prior work experience stated as a requirement in the respective qualifications. For Example:</p> <p>After 2 years of Industry work experience as Bioinformatics Associate/Analyst post qualifying the certification of Bioinformatics Associate/Analyst, candidate has an option to qualify for Bioinformatics Scientist Job role for an upward progression.</p>
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NSQC Approved