Model Curriculum

QP Name: Optical Fiber Technician

QP Code: TEL/Q6401

QP Version: 2.0

NSQF Level: 4

Model Curriculum Version: 1.0

Telecom Sector Skill Council || Telecom Sector Skill Council, 3rd Floor, Plot No. 126, Sector - 44 Gurgaon – 122003

Table of Contents

Training Parameters

Sector	Telecom
Sub-Sector	Passive Infrastructure
Occupation	Operations and Maintenance – Passive Infrastructure
Country	India
NSQF Level	4
Aligned to NCO/ISCO/ISIC Code	NCO-2015/7422.0801
Minimum Educational Qualification and Experience	Class 12th **OR** Class 10th + ITI **OR** Diploma (Science/Electronics/Telecom/IT and other relevant fields) **OR** Certified in NSQF L-3 Optical Fiber Splicer with 2 Years of Experience
Pre-Requisite License or Training	NA
Minimum Job Entry Age	17 Years
Last Reviewed On	30/12/2021
Next Review Date	30/12/2024
NSQC Approval Date	30/12/2021
QP Version	2.0
Model Curriculum Creation Date	30/09/2021
Model Curriculum Valid Up to Date	30/09/2024
Model Curriculum Version	1.0
Minimum Duration of the Course	480 Hours, 0 Minutes
Maximum Duration of the Course	480 Hours, 0 Minutes

Program Overview

This section summarizes the end objectives of the program along with its duration.

Training Outcomes

At the end of the program, the learner will be able to:

- Perform coordinating activities for cable laying and pulling
- Perform efficient protective and corrective maintenance procedures
- Discuss how to maintain OTDR (Optical Time Domain Reflectometer) register
- Describe how to optimize resources, work efficiently and adhere to safety standards
- Interact effectively with others while being sensitive of gender and persons with disabilities

Compulsory Modules

The table lists the modules, their duration and mode of delivery.

NOS and Module Details	Theory Duration	Practical Duration	On-the-Job Training Duration (Mandatory)	On-the-Job Training Duration (Recommended)	Total Duration
Bridge Module	**04:00**	**00:00**	**00:00**	**00:00**	**04:00**
Module 1: Role and Responsibilities of an Optical Fiber Technician	04:00	00:00	00:00	00:00	04:00
TEL/N4137– Coordinate Installations and Commissioning of Optical Fiber Cables **NOS Version No. 1.0** **NSQF Level 4**	**48:00**	**74:00**	**40:00**	**00:00**	**162:00**
Module 2: Carry Out Inspection of Route Plan	20:00	30:00	20:00	00:00	70:00
Module 3: Coordinate the activities to Install and Commission Optical Fiber Cable	28:00	44:00	20:00	00:00	92:00
TEL/N6403 – Undertake Condition Based Maintenance and Planned Repair Activities **NOS Version No. 2.0** **NSQF Level 4**	**30:00**	**50:00**	**40:00**	**00:00**	**120:00**
Module 4: Perform Planned Maintenance and Repair Activities	30:00	50:00	40:00	00:00	120:00

TEL/N6404 – Perform Corrective Maintenance/ Restoration of Optical Fiber Faults **NOS Version No. 2.0** **NSQF Level 4**	**36:00**	**38:00**	**40:00**	**00:00**	**114:00**
Module 5: Perform Corrective Maintenance Activities	36:00	38:00	40:00	00:00	114:00
TEL/N9101- Organize Work and Resources as Per Safety Standard **NOS Version No. 1.0** **NSQF Level 4**	**16:00**	**24:00**	**00:00**	**00:00**	**40:00**
Module 6: Plan Work Effectively, Optimise Resources and Implement Safety Practices	16:00	24:00	00:00	00:00	40:00
TEL/N9102 – Interact Effectively with Team Members and Customers **NOS Version No. 1.0** **NSQF Level 4**	**16:00**	**24:00**	**00:00**	**00:00**	**40:00**
Module 7: Communication and Interpersonal Skills	16:00	24:00	00:00	00:00	40:00
Total Duration	**150:00**	**210:00**	**120:00**	**00:00**	**480:00**

Module Details

Module 1: Role and Responsibilities of an Optical Fiber Technician
Bridge Module

Terminal Outcomes:

- Describe the role and responsibilities of an Optical Fiber Technician
- Explain the scope of work for an Optical Fiber Technician

Duration: *04:00*	Duration: *00:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Discuss the size and scope of the Telecom industry and Passive Infrastructure sub-sector. - Identify the roles and responsibilities of an Optical Fiber Technician. - Discuss the career progression of an Optical Fiber Technician in the Telecom industry. - Explain the fundamentals and concept of telecommunication and the terminologies used in the work process.	
Classroom Aids	
Whiteboard, Markers, Duster, Projector, Laptop, Presentation	
Tools, Equipment and Other Requirements	
NA	

Module 2: Carry Out Inspection of Route Plan
Mapped to NOS TEL/N4137 v 1.0

Terminal Outcomes:

- Perform the inspection procedure of the route plan

Duration: *20:00*	Duration: *30:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Discuss the significance of an effective route inspection. - Explain the pre-requisites to verify the proposed route to ensure that bend ratios meet manufacturer specifications and industry standards. - Discuss the procedure to develop installation work plan. - Explain various types of permissions required for installation works. - Describe various optical fiber modes (Single mode or multi-mode) and configurations based on types of the location.	- Apply appropriate practices to verify the proposed route to ensure that bend ratios meet manufacturer specifications and industry standards. - Prepare sample installation workplan. - Demonstrate how to liaise with the concerned authorities for obtaining clearances.
Classroom Aids	
Training kit (Trainer guide, Presentations), Whiteboard, Markers, Duster, Computer, Projector, Participant Handbook	
Tools, Equipment and Other Requirements	
Test Equipment – Fiber Optic Power Meter, Fiber Optic Test Source, Adapters for Power Meter (Various types of optical cables), OTDR, Cable Cutter, Cable Splitter, Reference Test Cables	

Module 3: Co-ordinate the Activities to Install and Commission Optical Fiber Cable
Mapped to NOS TEL/N4137 v 1.0

Terminal Outcomes:

- Manage tools and spare parts
- Complete fiber installation and commissioning process

Duration: *28:00*	Duration: *44:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Discuss the characteristics of OpticalFiber like refraction, polarization, attenuation, dispersion, etc. - Discuss the principles of opticaltransport media. - Discuss signal strength and quality KPIs of optical fiber cables. - Explain the uses of various installation equipment (Tubing Cutter, Rotary CableSlitting & Ringing Tool, Fiber Optic Stripper, Buffer Tube Stripper, Crimp Tool, etc.) and test tools (Flashlight Continuity Tester (MM only) or Visual Fault Locator, Light source, Power meter, Power meter adapters, etc.). - Describe the handling and safety guidelines for installing Fiber OpticCables. - Explain the significance of testing thecable on the drum for optical continuity. - Discuss commonly occurring hazards while handling the Optical Fiber Cables. - Explain the standard cable installation process (like trenching, cable laying, pitpreparation, splicing, jointing, blowing and back-filling, etc.) for installation of OFCs. - Describe fault analysis procedures and safety measures for different tools and mechanical equipment.	- Identify the tools and equipment required for optical fiber installation. - Demonstrate the operations of various tools and equipment required for optical fiber installation. - Apply appropriate practices to handle Optical fiber cables. - Demonstrate the method of trenching. - Demonstrate the procedure of cable pulling and cable blowing. - Demonstrate the methods of the cable preparation. - Employ appropriate techniques to determine the errors during installationand troubleshoot the same, - Perform the steps of receiving the fault notification, restoration, and repairing process. - Draft a sample Optical Time Domain Reflectometer (OTDR) report and summary of test to escalate any fault or issues to the Supervisor.
Classroom Aids	
Training kit (Trainer guide, Presentations), Whiteboard, Markers, Duster, Computer, Projector, Participant Handbook	
Tools, Equipment and Other Requirements	
Equipment – Fiber Optic Power Meter, Fiber Optic Test Source, Adapters for Power Meter (for various types of optical cables), Optical Time Domain Reflectometer (OTDR), Cable Cutter, Cable Splitter, Reference Test Cables	

Module 4: Perform Planned Maintenance and Repair Activities
Mapped to NOS TEL/N6403 v 2.0

Terminal Outcomes:

- Perform the activities to maintain and repair the dark/spare optical fiber
- Create OFC, OTDR and assets registers

Duration: *30:00*	Duration: *50:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Explain the concept and various elements of an as-build drawing. - Describe the importance of the Standard Operating Procedure for maintaining the equipment. - Explain the operating procedure of various test tools, such as Optical Time Domain Reflectometer (OTDR), power meter, light meter, etc. - Discuss various types of testing and repair procedures of the equipment. - Discuss commonly occurring errors while performing the physical maintenance activities. - Describe the procedure of reporting and documentation of the maintenance tasks.	- Demonstrate the procedure of sample check of as-build drawing. - Perform Optical Time Domain Reflectometer (OTDR) and Power meter tests for the dark/spare fibers. - Apply appropriate practices to test end-to-end link for adherence to link budget and identify loss and reflection points. - Demonstrate the planned maintenance activities for the Optical fiber Cables. - Perform the general maintenance of the tools and equipment, - Create a sample Optical Fiber Cable/ Optical Time Domain Reflectometer register as well as assets register for sites.
Classroom Aids	
Training kit (Trainer guide, Presentations), Whiteboard, Markers, Duster, Computer, Projector, Participant Handbook	
Tools, Equipment and Other Requirements	
Optical test tools (Optical Time Domain Reflectometer (OTDR), Power meter, Light meter, etc.), Sample as-build drawing, Cable Jacket Stripper, Connector Crimper, Fiber optic stripper, Tweezers, Cleaver, polishing puck for connectors, Polishing Plate, Black work mats, Fusion Splicer (Splicing machine), Related Standard Operating Procedures (SOPs), Format of various related reports	

Module 5: Perform Corrective Maintenance Activities
Mapped to NOS TEL/N6404 v 2.0

Terminal Outcomes:

- Perform the steps of corrective maintenance procedure of Optical Fiber Cables

Duration: *36:00*	Duration: *38:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Discuss the importance of prompt handling of fault notification, - Explain the standard fault diagnosis and rectification procedure of the equipment, - Explain the procedure of various duct integrity tests, like air tightness and kink free tests. - Describe cable and route marking procedure, - Explain the importance of adhering to the standards and follow optimal values of OTDR, power meter, etc.	- Prepare the fault identification flow chart. - Demonstrate the procedure of identifying the fault location. - Employ appropriate practices to assess and verify the joint activities. - Perform various tests to verify the duct integrity. - Apply appropriate practices to co-ordinate with the labourer for the backfilling of the trench. - Demonstrate the procedure of rectifying the network problem. - Record all jointing test readings and analyse the test result to generate the acceptance report. - Perform the procedure to generate a sample jointing report using the results/findings in proper formats.
Classroom Aids	
Training kit (Trainer guide, Presentations), Whiteboard, Markers, Duster, Computer, Projector, Participant Handbook	
Tools, Equipment and Other Requirements	
Test equipment (Optical Time Domain Reflectometer (OTDR), Power meter, etc.), Related Standard Operating Procedures (SOPs), Format of various related reports	

Module 6: Plan Work Effectively, Optimise Resources and Implement Safety Practices
Mapped to TEL/N9101 v 1.0

Terminal Outcomes:

- Explain how to plan work effectively, implement safety practices and Optimise use of resources.

Duration: *16:00*	Duration: *24:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- List the recent skills and technologies prevalent in the telecom industry. - Discuss the commonly occurring problems with their causes and solutions. - State the importance of keeping the workplace clean, safe and tidy. - List different types of hazards and the procedure to report it to the supervisor. - List the precautionary steps one needs to follow while handling hazardous materials. - State the importance of participating in fire drills and other safety workshops. - Discuss the significance of conforming to basic hygiene practices such as washing hands, using alcohol-based hand sanitizers. - List the different methods of cleaning, disinfection, sanitization, etc. - Discuss the importance of self-quarantine or self-isolation. - Explain the path of disease transmission. - Discuss organizational hygiene and sanitation guidelines and ways of reporting breaches/gaps, if any. - Explain the ways to optimize usage of resources. - Discuss various methods of waste management and disposal. - List the different categories of waste for the purpose of segregation. - Differentiate between recyclable and non-recyclable waste. - State the importance of using appropriate color dustbins for different types of waste.	- Prepare a time schedule to complete the tasks on the given time. - Demonstrate the use of safety equipment such as goggles, gloves, ear plugs, shoes, etc. - Demonstrate the correct postures while working and handling hazardous materials at the workplace. - Demonstrate how to evacuate the workplace in case of an emergency. - Show how to sanitize and disinfect one's work area regularly. - Demonstrate the correct way of washing hands using soap and water. - Demonstrate the correct way of sanitizing hands using alcohol-based hand rubs. - Display the correct way of wearing and removing PPE such as face masks, hand gloves, face shields, PPE suits, etc. - Demonstrate warning labels, symbols and other related signages. - Perform basic checks to identify any spills and leaks and that need to be plugged /stopped. - Demonstrate different disposal techniques depending upon different types of waste. - Employ different ways to clean and check if equipment/machines are functioning as per requirements and report malfunctioning, if observed. - Demonstrate ways for efficient utilization of material and water.

• Discuss the common sources of pollution and ways to minimize it.	

Classroom Aids

White board/ black board marker / chalk, Duster, Computer or Laptop attached to LCD projector

Tools, Equipment and Other Requirements

Personal Protection Equipment: Safety glasses, Head protection, Rubber gloves, Safety footwear, Warning signs and tapes, Fire extinguisher and First aid kit

Module 7: Communication and Interpersonal Skills
Mapped to TEL/N9102 v 1.0

Terminal Outcomes:

- Discuss how to communicate effectively and develop interpersonal skills
- Explain the importance of developing sensitivity towards differently abled people

Duration: *16:00*	**Duration**: *24:00*
Theory – Key Learning Outcomes	**Practical – Key Learning Outcomes**
- Discuss the importance of following the standard operating procedures of the company w.r.t priority, confidentiality and security. - Explain the standard procedure of communication and escalations of issues at the workplace. - Discuss the importance of timely rectification of issues. - State the importance of coordinating and resolving conflicts with the team members to achieve smooth workflow. - Discuss about the different types of disabilities with their respective issues. - List health and safety requirements for persons with disability. - Describe the rights, duties and benefits available at workplace for person with disability. - Explain the process of recruiting people with disability for a specific job. - Discuss the specific ways to help people with disability to overcome the challenges.	- Use different modes of communication as per requirement and need. - Prepare a sample report of the commonly occurring errors and their solutions. - Demonstrate the use of gender and PwD (Person with Disability) inclusive language. - Prepare a list of institutes and government schemes that help PwD in overcoming challenges. - Demonstrate the ideal behavior with a PwD in an organization.
Classroom Aids	
Whiteboard and Markers, Chart paper and sketch pens, LCD Projector and Laptop for presentations	
Tools, Equipment and Other Requirements	
Sample of escalation matrix, organization structure	

Module 8: On-the-Job Training
Mapped to Optical Fiber Technician

Mandatory Duration: *120:00*	Recommended Duration: *00:00*
Location: On-Site	

Terminal Outcomes

1. Inspect the proposed route to ensure that bend ratios meet manufacturer specifications and standards.
2. Create an installation workplan as per route.
3. Coordinate with the people for obtaining clearances.
4. Collect the tools and equipment needed for optical fiber installation.
5. Ensure that all tools and equipment are functioning properly.
6. Perform trenching for the installation.
7. Perform cable pulling and cable blowing as per SOP.
8. Prepare the cable for installation.
9. Check for errors during installation and troubleshoot them.
10. Ensure that proper fault notification is received, restored, and fault is repaired.
11. Create a Optical Time Domain Reflectometer (OTDR) report to share with the supervisor.
12. Conduct OTDR and Power meter tests for the dark/spare fibers.
13. Test end- to-end link for adherence to budget and identify loss and reflection points.
14. Perform periodic and corrective maintenance of Optical fiber Cables.
15. Prepare a Optical Fiber Cable/ Optical Time Domain Reflectometer record to note down the details and assets for sites.
16. Perform fault location using appropriate techniques.
17. Conduct different tests to verify the duct integrity.
18. Coordinate with the other teams for backfilling of the trench.
19. Rectify network problems, if observed.
20. Record test readings and analyse the test results to create the acceptance report.
21. Create a jointing report using the results/findings in prescribed formats.

Annexure

Trainer Requirements

Trainer Prerequisites						
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	*Specialization*	*Years*	*Specialization*	
Diploma	Science/Electronics/ Telecom/IT and other related domains	2	Optical Fiber Domain	0	NA	Eligible for ToT program
Graduate	Science/Electronics/ Telecom/IT and other relevant domains	1	Optical Fiber Domain	0	NA	Eligible for ToT program

Trainer Certification	
Domain Certification	**Platform Certification**
Job Role: "Optical Fiber Technician Level 4" "TEL/Q6401" version 2.0, Minimum accepted score is 80%	Job Role: "Trainer", "MEP/Q2601, v1.0", Minimum accepted score is 80%

Assessor Requirements

Assessor Prerequisites					
Minimum Educational Qualification	**Specialization**	**Relevant Industry Experience**		**Training Experience**		**Remarks**
		Years	*Specialization*	*Years*	*Specialization*	
Diploma	Science/Electronics/ Telecom/IT and other related domains	2	Optical Fiber Domain	0	NA	Eligible for ToA program
Graduate	Science/Electronics/ Telecom/IT and other related domains	1	Optical Fiber Domain	0	NA	Eligible for ToA program

Assessor Certification	
Domain Certification	**Platform Certification**
Job Role: "Optical Fiber Technician Level 4" "TEL/Q6401" version 2.0, Minimum accepted score is 80%	Job Role: "Assessor" "MEP/Q2701, v 1.0", Minimum accepted score is 80%

Assessment Strategy

This section includes the processes involved in identifying, gathering and interpreting information to evaluate the learner on the required competencies of the program.

1. Assessment System Overview:
   - Batches assigned to the assessment agencies for conducting the assessment on SDSM/SIP or email
   - Assessment agencies send the assessment confirmation to VTP/TC looping SSC
   - Assessment agency deploys the ToA certified Assessor for executing the assessment
   - SSC monitors the assessment process & records

2. Testing Environment
   - Confirm that the centre is available at the same address as mentioned on SDMS or SIP
   - Check the duration of the training.
   - Check the Assessment Start and End time to be as 10 a.m. and 5 p.m.
   - If the batch size is more than 30, then there should be 2 Assessors.
   - Check that the allotted time to the candidates to complete Theory & Practical Assessment is correct.
   - Check the mode of assessment—Online (TAB/Computer) or Offline (OMR/PP).
   - Confirm the number of TABs on the ground are correct to execute the Assessment smoothly.
   - Check the availability of the Lab Equipment for the particular Job Role.

3. Assessment Quality Assurance levels / Framework:
   - Question papers created by the Subject Matter Experts (SME)
   - Question papers created by the SME verified by the other subject Matter Experts
   - Questions are mapped with NOS and PC
   - Question papers are prepared considering that level 1 to 3 are for the unskilled & semi-skilled individuals, and level 4 and above are for the skilled, supervisor & higher management
   - Assessor must be ToA certified & trainer must be ToT Certified
   - Assessment agency must follow the assessment guidelines to conduct the assessment

4. Types of evidence or evidence-gathering protocol:
   - Time-stamped & geotagged reporting of the assessor from assessment location
   - Center photographs with signboards and scheme specific branding
   - Biometric or manual attendance sheet (stamped by TP) of the trainees during the training period
   - Time-stamped & geotagged assessment (Theory + Viva + Practical) photographs & videos

5. Method of verification or validation:
   - Surprise visit to the assessment location
   - Random audit of the batch
   - Random audit of any candidate

6. Method for assessment documentation, archiving, and access
   - Hard copies of the documents are stored
   - Soft copies of the documents & photographs of the assessment are uploaded / accessed from Cloud Storage
   - Soft copies of the documents & photographs of the assessment are stored in the Hard Drives

References

Glossary

Term	Description
Declarative Knowledge	Declarative knowledge refers to facts, concepts and principles that need to be known and/or understood in order to accomplish a task or to solve a problem.
Key Learning Outcome	Key learning outcome is the statement of what a learner needs to know, understand and be able to do in order to achieve the terminal outcomes. A set of key learning outcomes will make up the training outcomes. Training outcome is specified in terms of knowledge, understanding (theory) and skills (practical application).
OJT (M)	On-the-job training (Mandatory); trainees are mandated to complete specified hours of training on site
OJT (R)	On-the-job training (Recommended); trainees are recommended the specified hours of training on site
Procedural Knowledge	Procedural knowledge addresses how to do something, or how to perform a task. It is the ability to work, or produce a tangible work output by applying cognitive, affective or psychomotor skills.
Training Outcome	Training outcome is a statement of what a learner will know, understand and be able to do **upon the completion of the training**.
Terminal Outcome	Terminal outcome is a statement of what a learner will know, understand and be able to do **upon the completion of a module.** A set of terminal outcomes help to achieve the training outcome.

Acronyms and Abbreviations

Term	Description
QP	Qualification Pack
NSQF	National Skills Qualification Framework
NSQC	National Skills Qualification Committee
NOS	National Occupational Standards
AC	Air Conditioner
DG	Diesel Generator
PIU	Power Interface Unit
SMPS	Switch Mode Power Supply
BB	Battery Bank
IPMS	Integrated Power Management System
IP	Internet Protocol
OPCO	Operating Company
PM	Preventive Maintenance
OPEX	Operating Expenditure
PPE	Personal Protective Equipment
MUX	Multiplexer
RCC pipes	Reinforced Cement Concrete pipes
PwD	Persons with Disabilities
SHE	Safety Health & Environment
CRM	Customer Relationship Management
EB	Electricity Board
STM	Synchronous Transport Module
NOC	Network Operating Centre
TDM	Time Division Multiplexing