

Model Curriculum

Outside Plant Fiber Installation, Testing and Commissioning Supervisor

SECTOR: TELECOM
SUB-SECTOR: PASSIVE INFRASTRUCTURE
OCCUPATION: OPERATIONS & MAINTENANCE
REF ID: TEL/Q4107, V1.0
NSQF LEVEL: 5



Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

TELECOM SECTOR SKILL COUNCIL

for

MODEL CURRICULUM

Complying to National Occupational Standards of Job Role/ Qualification Pack:
'Outside Plant Fiber Installation, Testing and Commissioning Supervisor'
QP No. 'TEL/Q4107 NSQF Level 5'

Date of Issuance: **Nov 10th, 2017**

Valid up to*: **Nov 10th, 2021**

**Valid up to the next review date of the Qualification Pack*



Authorised Signatory
(Telecom Sector Skill Council)

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Outside Plant Fiber Installation, Testing and Commissioning Supervisor

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Outside Plant Fiber Installation, Testing & Commissioning Supervisor”, in the “Telecom” Sector/Industry and aims at building the following key competencies amongst the learner.

Program Name	Outside Plant Fiber Installation, Testing & Commissioning Supervisor		
Qualification Pack Name & Reference ID.	TEL/Q4107, Version 1.0		
Version No.	1.0	Version Update Date	10-11-2017
Pre-requisites to Training	<ul style="list-style-type: none"> • Entry level 10+2 Pass or • Optical Fiber Technician (OFT) QP certified with one-year experience 		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Handle cable constructs, performance and selection criteria of fiber cables – Identify cable construction, performance parameters and fiber types • Check fiber connectorisation and splicing – Examine types of connector, splicing types – ribbon, mechanical and fusion splicing • Follow procedures for outside plant cable installation – Pre-installation checks and cable installation types – direct buried, underground (duct) and aerial installation • Prepare cables for termination and splicing – Fiber cable preparation, and cable slack management • Test and troubleshoot outside plant fiber – Testing parameters, demonstrate test equipment and record the result • Practice safety precautions with fiber optics – Follow safety procedures while working with fiber optics 		

This course encompasses 6 out of 6 National Occupational Standards (NOS) of “Outside Plant Fiber Installation, Testing and Commissioning Supervisor” Qualification Pack issued by “TSSC: Telecom Sector Skill Council”

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1.	<p>Introduction</p> <p>Theory Duration (hh:mm) 20:00</p> <p>Practical Duration (hh:mm) 00:00</p> <p>Corresponding NOS Code Bridge Module</p>	<ul style="list-style-type: none"> Recall the fundamentals of optical fiber and their applications Summarize the history of optical fiber Solve the challenges faced during handling of fiber optics Illustrate on working principles of optical fiber communication system Compare optical fiber performance parameters like attenuation, bending, dispersion, cut-off wavelength and mode-field diameter Explain the various fiber geometric parameters (core, clad and buffer) Infer the importance of cable jackets, strength members and moisture/water blocking compounds 	NA
2.	<p>Handling Fiber constructs, performance and selection criteria</p> <p>Theory Duration (hh:mm) 20:00</p> <p>Practical Duration (hh:mm) 25:00</p> <p>Corresponding NOS Code TEL/N4126</p>	<ul style="list-style-type: none"> Explain basics of optical fiber cable constructions Identify primary fiber cable differentiators – simplex and zip cords, distribution cable and break-out cables Classify the optical fiber cable types – ribbon fiber cables, underground/buried cables, aerial cables, underwater and submarine cables Relate cable identifiers and primary requirements List the fiber standard colour codes Identify the optical fiber cable selection criteria like pulling strength, rodent penetration, grounding and bonding Outline single mode optical fiber cable specifications and ITU-T standardisations 	Different types of optical fiber cables – Multi-tube single jacket duct fiber cable, multi-tube double jacket dielectric armoured fiber, uni-tube single jacket ribbon fiber cable, multitube single jacket armoured figure-8 cable, multitube double jacket ADSS fiber cable
3.	<p>Fiber connectorisation splicing and first level checks</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 50:00</p> <p>Corresponding NOS Code TEL/N4127</p>	<ul style="list-style-type: none"> Identify fiber connectors, their construction, connector ferrule shapes and polishes Identify the connector colour codes (TIA568) Compare the different types of connector – SC, ST, FC/PC, MT Examine the causes of attenuation on connectors Interpret criterion for fiber connector performance Analyse the effect of polish type on connectors (Flat, PC, UPC, APC) Elaborate the procedure for termination of connectors 	Cleaver, Mechanical and fusion Splicing kit, Protection Sleeves, Fiber Stripper, Fiber reinforced plaster

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> Estimate the importance of connector inspection and cleaning Solve the challenges faced by single mode connectorisation Distinguish the different types of alignment mechanisms in mechanical splices Illustrate the processes of mechanical splicing Illustrate the processes of fusion splicing Illustrate the processes of ribbon splicing Evaluate the quality of splices – good splices or bad splices Test and troubleshoot issues related to splicing – not fused through, match heads, constriction, enlargement, bubble or inclusion Perform standard cleaning practices before beginning and during start of the splicing process Inspect the periodical checking and cleaning practices Compile the checklist of splicing process 	
4.	<p>Outside plant cable installation procedures and practices</p> <p>Theory Duration (hh:mm) 15:00</p> <p>Practical Duration (hh:mm) 45:00</p> <p>Corresponding NOS Code TEL/N4128</p>	<ul style="list-style-type: none"> Mark the pre-construction survey on the site Perform pre-testing with an OTDR Illustrate cable hauling process and pre-installation check with the following constraint check – maximum pulling tension, maximum bending radius, total cable length, splicing length requirement at end points Carry out duct rodding, testing and cleaning processes Select appropriate cables for installation procedures – direct buried installation (single jacket, dual jacketed cable), underground (duct) installation (“figure 8” demonstration), aerial installation (bending radius, placing tension) 	Cable blowing machines, Protection Sleeves, Fiber Stripper, OTDR, Different types of fiber cables (aerial, buried and underground), drum flanges
5.	<p>Preparing cable for termination and splicing</p> <p>Theory Duration (hh:mm) 10:00</p>	<ul style="list-style-type: none"> Pull the cable (by removing strength members in the cables) Construct armoured cable using ripcord Construct dual jacket plant cable using a Kellum’s grip Pull optic cable by placing the cable drum in upright position 	Different types of fiber cables, needle-nose pliers, scissors, slack brackets, shaft

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	<p>Practical Duration (hh:mm) 30:00</p> <p>Corresponding NOS Code TEL/N4129</p>	<ul style="list-style-type: none"> Lift cable drums with a shaft without damage Handle fork-lift to keep the drums in upright position Roll the drums as per the direction marked on the drum flanges Measure the cable slack management based on cable bend radius 	
6.	<p>Outside plant fiber testing and troubleshooting</p> <p>Theory Duration (hh:mm) 15:00</p> <p>Practical Duration (hh:mm) 20:00</p> <p>Corresponding NOS Code TEL/N4130</p>	<ul style="list-style-type: none"> Compare the optical power measurement parameters (optical power, attenuation levels at fiber, connectors) fault location Calibrate the test equipment like OTDR, optical power meter, visual cable fault locator, OLTS, visual inspection test (using fiber tracer) Measure power levels for loss testing using Fiber optic power meters Measure optical loss or attenuation in fibers, cables or connectors from optical fiber test source Perform visual inspection test of connectors using microscope Measure the loss of fiber, connectors and connectorized cables using Optical loss test sets (OLTS) Visualise the phenomenon of back-scattering and find faults and optimize splices using Optical Time Domain Reflectometer (OTDR) Check cable continuity using visual cable tracers and fault locators Illustrate “one-cable”, “two cables” and “three cables” tests for loss measurement Identify the types of faults or failures in fiber cable Perform testing the installed fiber optic cable plant – continuity testing, insertion loss test Compare different types of OSP Network Testing – Chromatic dispersion cause, material dispersion, waveguide dispersion, chromatic dispersion 	Optical power meter, Fiber optic test source, OLTS, OTDR, Visual Cable tracer, attenuators
7.	<p>Work Safety with fiber optics</p> <p>Theory Duration (hh:mm) 10:00</p>	<ul style="list-style-type: none"> Perform fiber work safety in fiber optic installations Wear eye-safety to protect cornea or lens during work Handle safely bare fiber from broken ends of fibers and scraps of fibers during termination and splicing 	Safety glasses, safety hand-gloves, microscope with infrared filters, isopropyl alcohol, adhesives, class III optical amplifiers

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	<p>Practical Duration (hh:mm) 10:00</p> <p>Corresponding NOS Code TEL/N4131</p>	<ul style="list-style-type: none"> • Compare the manufacturer supplied material safety data sheet (MSDS) with on-ground materials • Follow fire safety practices while using electric arc to make fusion splicers • Comply and adhere electrical safety norms while working with fiber hardware connectivity • Summarize the laser safety norms and applicable classes • Record the health and safety instances 	
	<p>Total Duration</p> <p>Theory Duration 120:00</p> <p>Practical Duration 180:00</p>	<p>Unique Equipment Required:</p> <p>Projector, Laptop/PC, White Board, Marker, multi-tube single jacket duct fiber cable, multi-tube double jacket dielectric armoured fiber, uni-tube single jacket ribbon fiber cable, multitube single jacket armoured figure-8 cable, multitube double jacket ADSS fiber cable, cleaver, mechanical and fusion splicing kit, Protection sleeves, fiber stripper, fiber reinforced plaster, Cable blowing machines, OTDR, Different types of fiber cables (aerial, buried and underground), drum flanges, needle-nose pliers, scissors, slack brackets, shaft, Optical power meter, fiber optic test source, OLTS, OTDR, visual cable tracer, attenuators, safety glasses, safety hand-gloves, microscope with infrared filters, isopropyl alcohol, adhesives, class III optical amplifiers.</p>	

Grand Total Course Duration: **300Hours, 0 Minute**

*(This syllabus/ curriculum has been approved by **TSSC: Telecom Sector Skill Council**)*

Trainer Prerequisites for Job role: “Outside Plant Fiber Installation, Testing & Commissioning Supervisor” mapped to Qualification Pack: “TEL/Q4107, V1.0”

Sr. No.	Area	Details
1	Description	OSP Installation, testing and commissioning supervisor is responsible for on-site optical fiber installation activities adhering to the best practices for optical splicing, testing and safety compliances/measures on the field.
2	Personal Attributes	Good analytical skills, on-site problem-solving skills, attention to details and fair communication skills to interact with team members and higher-ups are required for the role.
3	Minimum Educational Qualifications	ITI/ Diploma
4a	Domain Certification	Certified for Job Role: “ <u>Outside Plant Fiber Installation, Testing and Commissioning Supervisor</u> ” mapped to QP: “ <u>TEL/Q4107</u> ”, Version No. 1.0 Minimum accepted score should be mentioned as 80%.
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: “ <u>Trainer</u> ”, mapped to the Qualification Pack: “ <u>MEP/Q0102</u> ”, Version No. 1.0 Minimum accepted score as per SSC guidelines is 80%.
5	Experience	<ul style="list-style-type: none"> The trainer should be certified by TSSC as ‘Train the Trainer’ and ‘Assessor’ Worked as Optical Fiber Technician for a minimum of 1 year

Annexure: Assessment Criteria

Assessment Criteria	
Job Role	Outside Plant Fiber Installation, Testing and Commissioning Supervisor
Qualification Pack	TEL/Q4107, V. 1.0
Sector Skill Council	Telecom

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC
2	The assessment for the theory part will be based on knowledge bank of questions created by the SSC
3	Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS
4	Individual assessment agencies will create unique question papers for theory and skill practical part for each candidate at each examination/ training center
5	To pass the Qualification Pack, every trainee should score a minimum 70% of aggregate marks to successfully clear the assessment
6	In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack

Compulsory NOS			Marks Allocation		
Total Marks: 600			Out Of	Theory	Skills Practical
Assessment Outcomes	Assessment Criteria	Total Marks			
TEL/N4126 Handling Fiber constructs, performance and selection criteria	PC1. identify fiber cable construct (core, clad, buffer coating)	100	5	2	3
	PC2. identify various cable components (fiber, strength members, jackets)		5	2	3
	PC3. identify and work with strengthening members, rip cords and armored fibers		5	1	4
	PC4. understand transmission principle for various types of fiber (multi-mode, single mode)		7	7	0
	PC5. identify key performance parameters for an optical fiber (attenuation, fiber size and bandwidth)		6	0	6
	PC6. gauge performance by reading characteristic chart/parameters		6	0	6
	PC7. identify causes of attenuation (scattering, absorption)		3	0	3
	PC8. understand cause and effect of reflection and dispersion (modal, chromatic, polarization)		3	1	2
	PC9. differentiate between speed and bandwidth		5	5	0
	PC10. co-relate between attenuation and wavelength		4	4	0
	PC11. understand relevance of cut-off wavelength		5	4	1
	PC12. identify and differentiate various fiber types as per their construction (zip cord, distribution, loose tube, breakout)		7	3	4
	PC13. identify and differentiate various fiber types as per use (armored, aerial, direct burial, underwater)		4	2	2
	PC14. deploy suitable fiber type based on deployment and its characteristics		7	4	3
	PC15. identify cables as per the standard colour codes		8	5	3
	PC16. select the appropriate cable as per the situation (pulling strength, water protection, rodent penetration)		10	5	5
	PC17. demonstrate grounding & bonding for armored cables		10	4	6
TOTAL		100	49	51	
TEL/N4127 Fiber connectorization, splicing and first level checks	PC1. identify connectors on basis of color code (TIA 568)		5	4	1
	PC2. select a particular type of connector (ST, SC, FC/PC, MT, LC) for a given use		3	1	2
	PC3. understand the effect of polish type (Flat, PC, UPC, APC) on the connector performance		5	5	0
	PC4. perform connector termination on field environment (use of termination tools, cable tools & test equipment) including connector inspection and cleaning		6	2	4

	PC5. demonstrate fiber preparation for splicing (strip jacket, dressing buffer tubes & fibers, strength members, removal of buffer coating)		3	0	3
	PC6. demonstrate fiber cleaning		3	0	3
	PC7. demonstrate fiber cleaving		3	0	3
	PC8. demonstrate mechanical splicing (Elastomeric)		4	0	4
	PC9. demonstrate fiber preparation for fusion splicing (as per PC 5,6,7 above)		5	0	5
	PC10. demonstrate use of splicing equipment, selection of correct splicing program, arc calibration, dust check and cleaning of clamp/groove	100	5	0	5
	PC11. demonstrate fusion splicing		6	0	6
	PC12. demonstrate fiber preparation for ribbon splicing (use of ribbon jacket stripper)		6	0	6
	PC13. demonstrate ribbon cleaving (using ribbon cleaver)		5	0	5
	PC14. demonstrate ribbon splicing		4	0	4
	PC15. demonstrate first level/immediate (post splicing) checks (using VFL, OTDR)		4	0	4
	PC16. demonstrate splice evaluation (white line, offset, diameter difference, bubble, bulge etc.		10	2	8
	PC17. identify common problems and likely causes, for an improper splicing		10	5	5
	PC18. comprehend the data recording and reporting formats		5	3	2
	PC19. perform basic documentation process like recording test results, performance parameters, cable & drum markings etc.		4	4	0
	PC20. submit the records & documents to appropriate authorities to inspect	4	2	2	
	TOTAL		100	28	72
TEL/N4128 Outside Plant Cable Installation procedures & practices	PC1. carry out pre-construction survey of the cable placing route and identify all probable pit-falls and account for them	100	4	2	2
	PC2. perform Pre-test of optical cable using a OTDR		3	1	2
	PC3. undertake pre-installation cable inspection to identify any visible damage or non-compliances		4	0	4
	PC4. confirm basic parameters like max pulling tension, max bending radius, total cable length, splicing length required at termination points		5	2	3
	PC5. demonstrate duct rodding, testing and cleaning process/procedure		4	2	2
	PC6. select appropriate cable for direct buried (single jacket, dual jacket) as per the sight requirements		6	3	3
	PC7. demonstrate armor bonding and grounding		4	1	3
	PC8. handle cable while bending and placing tension		6	0	6

	PC9. perform cable laying and trench compacting practices and placement of markers		8	2	6
	PC10. carry out reinstatements		2	0	2
	PC11. understand best practices in duct cable pulling using proper tools and accessories (pulling rope, cable pulling grip, breakaway swivel)		4	0	4
	PC12. demonstrate cable reel positioning and pulling		7	2	5
	PC13. demonstrate “figure 8” winding/storing of cable		5	0	5
	PC14. understand cable blowing process (wing compressed air)		6	0	6
	PC15. understand practices on duct integrity testing, duct fill ratio, co-efficient of friction and their effect on cable laying/longevity		5	2	3
	PC16. understand specific construction of aerial cables making them suitable for such deployment		8	2	6
	PC17. demonstrate cable handling practices for aerial cables (bending radius, placing tension)		6	2	4
	PC18. demonstrate use and uniqueness of messenger strand		6	3	3
	PC19. demonstrate deployment and use of self-supporting cables		2	2	0
	PC20. demonstrate deployment process for aerial cable		5	2	3
	TOTAL		100	28	72
TEL/N4129 Preparing Cables for termination and splicing	PC1. demonstrate cable preparation (removal of outer jacket, use of rip-cord, identifying and dressing strength member)	100	11	4	7
	PC2. demonstrate use of Kellum’s grip and armored cable cutter		12	6	6
	PC3. demonstrate use of armored cable cutter		10	4	6
	PC4. demonstrate correct cable drum position for pulling fiber cable		10	4	6
	PC5. understand cable handling procedure/process whilst lifting drums, shifting cables, handling with fork-lifts and placed in correct position		15	7	8
	PC6. demonstrate correct positioning and rolling of drums		12	3	9
	PC7. unloading and store the cable drums		10	2	8
	PC8. calculate the slack requirement as per standard practices		10	6	4
	PC9. demonstrate securing of slack in slack brackets		10	4	6
	TOTAL		100	40	60
TEL/N4130 Outside plant Fiber Testing	PC1. demonstrate measurement of optical parameters (optical power, attenuation (at fiber, cables, connectors), fault location)		10	4	6
	PC2. perform optical power and power loss measurement of an optical cable		10	4	6

and troubleshooting	PC3. demonstrate use of various devices (OTDR, optical power meter, visual cable fault locator, OLTS, visual inspection test (use of fiber tracer))	100	8	5	3
	PC4. perform visual inspection test of connectors using a microscope		8	4	4
	PC5. understand and demonstrate “two cables” and “three cables” tests for loss measurement		12	4	8
	PC6. understand and demonstrate insertion loss measurement using “patch cord test” and “double ended loss” technique		17	6	11
	PC7. record cable performance and test parameters like power, attenuation etc		11	5	6
	PC8. record cable inspection parameters as per the company policy/format provided		9	4	5
	PC9. ensure that documents are available to all appropriate authorities to inspect		15	8	7
	TOTAL		100	44	56
TEL/N4131 Work Safety practices whilst working with fiber optics	PC1. demonstrate eye-safety measures whilst at work	100	12	4	8
	PC2. demonstrate safe handling of bare fiber (broken ends of fiber and scraps)		14	6	8
	PC3. read and comprehend manufacturer supplied MSDS for safe handling of fiber		12	4	8
	PC4. demonstrate fire safety practices (whilst working with high voltage arc in fusion splicers)		12	4	8
	PC5. demonstrate electrical safety norms where fiber is placed along with electrical cables		12	6	6
	PC6. show awareness of laser safety rules		12	8	4
	PC7. demonstrate use of safety gloves and boots, in required situations		12	6	6
	PC8. complete any health and safety records legibly and accurately		14	6	8
TOTAL	100	44	56		

Model Curriculum

Fiber to-the Home (FTTH/X) Installer

SECTOR: TELECOM
SUB-SECTOR: PASSIVE INFRASTRUCTURE
OCCUPATION: NETWORK (PASSIVE) INSTALLATION
REF ID: TEL/Q4200, V1.0
NSQF LEVEL: 4



Certificate

CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

TELECOM SECTOR SKILL COUNCIL

for the

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: '**Fiber to-the Home (FTTH/X) Installer**'
QP No. '**TEL/Q4200 NSQF Level 4**'

Date of Issuance: 17th Oct 2018

Valid up to*: 17th Oct 2022

*Valid up to the next review date of the Qualification Pack



Authorised Signatory
(Telecom Sector Skill Council)

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Fiber to-the Home (FTTH/X) Installer

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Fiber to-the Home (FTTH/X) Installer” in the “Telecom” Sector/Industry and aims at building the following key competencies amongst the learner.

Program Name	Fiber to-the Home (FTTH/X) Installer		
Qualification Pack Name & Reference ID.	TEL/Q4200, Version 1.0		
Version No.	1.0	Version Update Date	17-Oct-18
Pre-requisites to Training	12 th		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Follow procedures for outside plant cable installation – Pre-installation checks and cable installation types – direct buried, underground (duct) and aerial installation • Prepare cables for splicing – Fiber cable preparation, and cable slack management • Install passive FTTH/X components – Installation of wall mount splitters, distribution ports and test the insertion loss and measure output power • Construct FTTH/X cabling inside the building – Cable installation through cable trays, conduits, false ceiling inside the customer premise and termination at Optical Network Terminal (ONT) and Telecommunication Outlet (TO) • Follow safety precautions pertaining to optical fiber – Use personal protective equipment such as safety glasses, safety hand-gloves while working with optical fiber and adhere the safety procedures 		

This course encompasses 5 out of 5 National Occupational Standards (NOS) of “Fiber to-the Home (FTTH/X) Installer” Qualification Pack issued by “TSSC: Telecom Sector Skill Council”

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1.	<p>Introduction</p> <p>Theory Duration (hh:mm) 15:00</p> <p>Practical Duration (hh:mm) 00:00</p> <p>Corresponding NOS Code Bridge Module</p>	<ul style="list-style-type: none"> Recall the fundamentals of optical fiber and their applications Summarize the history of optical fiber Solve the challenges faced during handling of fiber optics Illustrate on working principle of optical fiber communication system Compare optical fiber performance parameters like attenuation, bending, dispersion, cut-off wavelength and mode-field diameter Explain the various fiber geometric parameters (core, clad and buffer) Infer the importance of cable jackets, strength members and moisture/ water blocking compounds 	NA
2.	<p>Outside plant cable installation procedure and practices</p> <p>Theory Duration (hh:mm) 15:00</p> <p>Practical Duration (hh:mm) 45:00</p> <p>Corresponding NOS Code TEL/N4128</p>	<ul style="list-style-type: none"> Examine the pre-construction survey of the cable placing route Test the cable with an OTDR Inspect pre-installation cable for physical damage Illustrate cable hauling process and pre-installation check with the following constraint check – maximum pulling tension, maximum bending radius, total cable length, splicing length requirement at end points Carry out duct rodding, testing and cleaning processes Select appropriate cables for installation procedures – direct buried installation (single jacket, dual jacketed cable), underground (duct) installation (“figure 8” demonstration), aerial installation (bending radius, placing tension) 	Cable blowing machines, Protection Sleeves, Fiber Stripper, OTDR, Different types of fiber cables (aerial, buried and underground), drum flanges
3.	<p>Undertake splicing of Optical Fiber</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 55:00</p> <p>Corresponding NOS Code TEL/N6400</p>	<ul style="list-style-type: none"> Identify various tools and equipment used during the splicing process – OTDR, Power Meter etc. Test the connector end and follow the cleaning procedures Carry out splicing – mechanical or fusion splicing as required on-ground Test optical fiber cable for continuity, insertion loss and troubleshooting Test the optical fiber cables using optical inspection microscope, OTDR, Visual Fault Locator (VFL) 	Cleaver, Mechanical and fusion Splicing kit, Protection Sleeves, Fiber Stripper, Fiber reinforced plaster and Jointing, Optical test equipment - OTDR and power meter

Sr. No.	Module	Key Learning Outcomes	Equipment Required
4.	Installation of passive FTTH/X components Theory Duration (hh:mm) 25:00 Practical Duration (hh:mm) 35:00 Corresponding NOS Code TEL/N4200	<ul style="list-style-type: none"> Trace the passive network components and their deployment environment Outline the concept of feeder and distribution connections in a splitter Distinguish types of optical splitter and relative features Identify the splitter required on ground Demonstrate installation for wall mount splitters (1X8, 1X16, 1X32) Identify feeder and distribution – ports, cables/pigtails and connections on the devices Define power test procedure and principle Test the optical splitters – insertion loss and power output measurement (using OLTS and Light Source) 	Optical power meter, Fiber optic test source, OLTS, Optical splitters, Pigtails
5.	In-building FTTH/X Cabling Theory Duration (hh:mm) 25:00 Practical Duration (hh:mm) 35:00 Corresponding NOS Code TEL/N4201	<ul style="list-style-type: none"> Identify optical fiber types and characteristics for in-building deployments Measure the bend radius of fiber cable and fusion splicing Test the VLF principal and use of fiber pulling tools/equipment (fish tape) Inspect the sites and identify the cabling path from outdoor fiber landing point to ONT installation point Calculate the horizontal and vertical cable length to manage the cable slack Measure the pre-existing load and post-installation load compliance of the cable trays Lay the fiber along the identified tray tracks using appropriate cable pulling method Tie the fiber along the cable tray Demonstrate fiber pulling through conduits using appropriate tools (like fish tape) and technique (strength member) Secure excess fiber at the termination point Demonstrate cable installation through conduits on false ceiling Illustrate fiber termination at Optical Network Terminal (ONT) & Telecommunication Outlet (TO) Configure the ONT after providing power supply Test ONT using IP network Operate Visual Fault Locator (VFL) for the installed fiber run 	Fiber cables, Fish tape, ONT, Cable trays, VFL, Fiber detection meter

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> Test the live fiber using fiber detection meter Record the test values 	
6.	<p>Work Safety with fiber optics</p> <p>Theory Duration (hh:mm) 10:00</p> <p>Practical Duration (hh:mm) 10:00</p> <p>Corresponding NOS Code TEL/N4131</p>	<ul style="list-style-type: none"> Carry out the fiber work safety Use PPEs such as eye-safety to protect cornea or lens during work Handle safely bare fiber from broken ends of fibers and scraps of fibers during termination and splicing Compare the manufacturer supplied material safety data sheet (MSDS) with on-ground materials Follow fire safety practices while using electric arc to make fusion splicers Comply and adhere electrical safety norms while working with fiber hardware connectivity Summarize the laser safety norms and applicable classes Record the health and safety instances 	Safety glasses, safety hand-gloves, microscope with infrared filters, isopropyl alcohol, adhesives, class III optical amplifiers
	<p>Total Duration</p> <p>Theory Duration 120:00</p> <p>Practical Duration 180:00</p>	<p>Unique Equipment Required:</p> <p>Projector, Laptop/PC, White Board, Marker, Cable blowing machines, Protection Sleeves, Fiber Stripper, OTDR, Different types of fiber cables (aerial, buried and underground), drum flanges, Cleaver, Mechanical and fusion Splicing kit, Fiber reinforced plaster and Jointing, Optical test equipment -OTDR and Optical power meter, Fiber optic test source, OLTS, Optical splitters, Pigtails, Fish tape, ONT, Cable trays, VFL, Fiber detection meter, safety glasses, safety hand-gloves, microscope with infrared filters, isopropyl alcohol, adhesives, class III optical amplifiers.</p>	

Grand Total Course Duration: **300Hours, 0 Minute**

(This syllabus/ curriculum has been approved by **TSSC: Telecom Sector Skill Council**)

Trainer Prerequisites for Job role: “Fiber to-the Home (FTTH/X) Installer” mapped to Qualification Pack: “TEL/Q4200, V1.0”

Sr. No.	Area	Details
1	Description	Fiber to-the Home (FTTH/X) Installer will undertake on-ground implementation of fiber cabling from drop point – Optical Line Terminals (OLTs) to the last mile connectivity i.e. customer premise (termination point). The work will include fiber splicing and termination at every distribution point. The work will follow the structured cabling norms and compliance to telecommunication cabling guidelines on the subject.
2	Personal Attributes	Good inter-personal skills, on-site problem-solving, eye for details, attention to compliance to work instructions & parameters and clear communication skills to interact with team members and higher-ups are required for the role
3	Minimum Educational Qualifications	ITI/ Diploma
4a	Domain Certification	Certified for Job Role: “Fiber to-the Home (FTTH/X) Installer” mapped to QP: “TEL/Q4200”, Version No. 1.0 Minimum accepted score should be mentioned as 80%
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “MEP/Q0102”, Version No. 1.0 Minimum accepted score as per SSC guidelines is 80%.
5	Experience	<ul style="list-style-type: none"> The trainer should be certified by TSSC as ‘Train the Trainer’ and ‘Assessor’ Worked as Optical Fiber Technician for a minimum of 1 year

Annexure: Assessment Criteria

Assessment Criteria	
Job Role	Fiber to-the Home (FTTH/X) Installer
Qualification Pack	TEL/Q4200, V 1.0
Sector Skill Council	Telecom

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC
2	The assessment for the theory part will be based on knowledge bank of questions created by the SSC
3	Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS
4	Individual assessment agencies will create unique question papers for theory and skill practical part for each candidate at each examination/ training center
5	To pass the Qualification Pack, every trainee should score a minimum 70% of aggregate marks to successfully clear the assessment
6	In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack

Compulsory NOS			Marks Allocation		
Total Marks: 500					
Assessment Outcomes	Assessment Criteria	Total Marks	Out Of	Theory	Skills Practical
TEL/N4128 Outside Plant Cable Installation Procedure & Practices	PC1. carry out pre-construction survey of the cable placing route and identify all probable pit-falls and account for them	100	4	2	2
	PC2. perform pre-test of optical cable using a OTDR		6	2	4
	PC3. undertake pre-installation cable inspection to identify any visible damage or non-compliances		6	0	6
	PC4. confirm basic parameters like max pulling tension, max bending radius, total cable length, splicing length required at termination points		3	2	1
	PC5. demonstrate duct rodding, testing and cleaning process/procedure		2	0	2
	PC6. select appropriate cable for direct buried (single jacket, dual jacket) as per the sight requirements		6	3	3
	PC7. demonstrate armor bonding and grounding		4	1	3
	PC8. handle cable while bending and placing tension		6	0	6
	PC9. perform cable laying and trench compacting practices and placement of markers		4	0	4
	PC10. carry out reinstatements		4	2	2
	PC11. understand best practices in duct cable pulling using proper tools and accessories (pulling rope, cable pulling grip, breakaway swivel)		4	0	4
	PC12. demonstrate cable reel positioning and pulling		7	2	5
	PC13. demonstrate “figure 8” winding/storing of cable		5	0	5
	PC14. understand cable blowing process (wing compressed air)		6	0	6
	PC15. understand practices on duct integrity testing, duct fill ratio, co-efficient of friction and their effect on cable laying/longevity		5	2	3
	PC16. understand specific construction of aerial cables making them suitable for such deployment		10	4	6
	PC17. demonstrate cable handling practices for aerial cables (bending radius, placing tension)		7	3	4
	PC18. demonstrate use and uniqueness of messenger strand		6	3	3
	PC19. demonstrate deployment and use of self-supporting cables		2	0	2
	PC20. demonstrate deployment process for aerial cable		3	2	1
TOTAL			100	28	72

TEL/N6400

Undertake Splicing of Optical Fiber

PC1.	verify that cable is installed as per the installation plan and visually inspect cable for signs of sheath damage
PC2.	ensure minimum bend ratios are maintained according to manufacturer's specifications to prevent cable damage and signal degradation
PC3.	ensure cable is placed on stable jointing pit
PC4.	secure cable according to safe industry practice to avoid cable and sheath damage
PC5.	identify the appropriate fiber to be joined based on colour coding and sequence
PC6.	identify appropriate place for the joint chamber location
PC7.	clean the fiber appropriately as per company/ manufacturer's specifications
PC8.	ensure availability of test equipment like OTDR and Power meter for carrying out optical tests
PC9.	ensure availability of optical equipment like spool, joint closure, connectors, splicer and cleaver
PC10.	ensure that faulty equipment sent to logistics team for repair and replacement
PC11.	ensure availability of Optical Fiber joint kits, Pigtailed, patch cords, 0dB connector, protection sleeves, heat shrinks
PC12.	ensure continuous power supply at site for the splicing operation by use of portable generators or stand-by heavy-duty batteries
PC13.	ensure availability of RCC joint chambers with covers as per specifications
PC14.	ensure availability of sand for filling the chambers
PC15.	ensure availability of one spare cable drum for emergency replacement of laid cables
PC16.	ensure calibration status of equipment to be used (e.g. splicing machine, OTDR, power meter, cleaver)
PC17.	ensure clean environment for splicing operations
PC18.	ensure cables are stripped off their protective coating areas where splicing must be performed as per the standard process
PC19.	ensure the fiber ends are cleaved with a precision cleaver and are inspected with magnifier to ensure appropriateness
PC20.	in case of fusion splicing - insert fibers strand to the fusion machine in accordance to product/equipment specifications

100

2	2	0
5	2	3
3	2	1
3	0	3
6	2	4
4	2	2
2	2	0
1	1	0
1	1	0
2	1	1
1	1	0
1	1	0
1	1	0
1	0	1
2	2	0
2	2	0
6	2	4
6	2	4

PC21. in case of mechanical splice, align the fibers together by a precision-made sleeve and place the prepared fiber in mechanical splicing kit	6	2	4
PC22. verify the spliced fiber for appropriate splicing in the magnifier window	1	1	0
PC23. ensure appropriate splice protectors like heat shrink splice protectors are utilized to protect the splice	2	2	0
PC24. test the fiber joint with OTDR to confirm conformance to design requirements	2	2	0
PC25. ensure optical losses - reflectance, return and insertion are within the defined specifications/ limits	4	3	1
PC26. ensure sealing of Joint closure through heat shrinking /multi diameter seals/mechanical seals as appropriate	3	2	1
PC27. ensure FRP - Fiber Reinforced Plastic is used to strengthen the joint as required	3	2	1
PC28. test the fiber at both ends for instances of cross fiber using power source and power meter tests and ensure their elimination	4	2	2
PC29. ensure joint is placed in the chamber properly	1	0	1
PC30. ensure spare cable (loop) is coiled appropriately and placed inside the joint	3	1	2
PC31. ensure that sand is filled in the chamber to the brim and the chamber covers are placed properly	3	2	1
PC32. ensure that Joint indicator is planted 1 meter behind the chamber location (away from road)	1	1	0
PC33. ensure that the indicator is painted proper color (for example yellow for joint)	1	1	0
PC34. ensure appropriate disposal of the cut fibers, sleeves and cable pieces	1	0	1
PC35. ensure compliance with site risk control, OHS, environmental and quality requirements as per company's norms	1	1	0
PC36. ensure that work is carried out in accordance to the level of competence and legal requirements	1	1	0
PC37. ensure that sites are assessed for health and safety risk as per company's guidelines prior to commencement of work	2	1	1
PC38. ensure compliance to health and safety guidelines by optical splicer and installation labor workers	1	1	0
PC39. ensure that Personal protection equipment like helmets, knee pads, safety boots, safety glasses and trench guards are appropriately used as required	1	0	1
PC40. ensure environmental conditions and hazards like Earth Potential Rise (EPR) are considered while carrying out the work	2	0	2
PC41. ensure escalation of safety incidents to relevant authorities as per guidelines	1	1	0

	PC42. ensure appropriate cable marking and Installation of chamber & route marker for direction and route identification		1	1	0
	PC43. ensure preparation of jointing record for future reference		1	1	0
	PC44. ensure that documents that are required to be updated are identified		1	1	0
	PC45. ensure completion of OTDR register showing complete record of jointing tests		1	1	0
	PC46. ensure that documents are available to all appropriate authorities to inspect		1	1	0
TOTAL			100	59	41
TEL/N4200 Installation of passive FTTH/X components	PC1. identify components of passive devices (splitters)	100	10	4	6
	PC2. demonstrate installation practices for wall mount splitters (1x8, 1x16, 1x32)		18	7	11
	PC3. identify feeder and distribution ports on the devices		13	4	9
	PC4. identify feeder and distribution cables/pigtails		12	5	7
	PC5. demonstrate feeder and distribution connections		14	5	9
	PC6. demonstrate insertion loss testing of optical splitters (OLTS and Light Source)		16	5	11
	PC7. demonstrate power output measurement at output port by use of power meter and light source (using OLTS & Light Source)		17	4	13
TOTAL			100	34	66
TEL/N4201 In-building FTTH/X Cabling	PC1. inspect the site as per building lay-out plan	100	4	0	4
	PC2. identify the cabling path from the outdoor fiber landing point (in the building premises) up to the intended ONT installation point (this to include both the cable tray as well as conduit runs)		8	2	6
	PC3. calculate the horizontal and vertical cable length, accounting for the slack to be maintained		5	5	0
	PC4. ascertain the pre-existing load and post installation load compliance of the cable trays		4	2	2
	PC5. ascertain and account for existing cable services on the cable trays (power cables, other data/voice cables etc.)		4	0	4
	PC6. lay the fiber along the identified tray tracks using appropriate cable pulling method		5	1	4
	PC7. secure the fiber along the cable tray ensuring proper slack management (especially for the vertical run)		5	0	5
	PC8. demonstrate fiber pulling through conduit using appropriate technique and tools (pulling through		8	2	6

		'strength member' and using correct tools like 'fish tape')				
	PC9.	demonstrate proper coiling and securing of excess fiber (approx. 3 meter) at the termination end	6	2	4	
	PC10.	demonstrate cable installation through false ceiling, using "figure 8" method	8	2	6	
	PC11.	demonstrate cable installation through conduits on false ceiling	8	2	6	
	PC12.	demonstrate fiber termination and connectorisation at ONT	9	3	6	
	PC13.	demonstrate fiber termination at TO	6	0	6	
	PC14.	demonstration powering and configuring of ONT	5	2	3	
	PC15.	test installed ONT using IP network	5	2	3	
	PC16.	undertake VFL (visual fault locator) for the installed fiber run	6	3	3	
	PC17.	test the live fiber using fiber detection meter	4	2	2	
	TOTAL		100	30	70	
TEL/N4131 Work Safety practices whilst working with Fiber optics	PC1.	demonstrate eye-safety measures whilst at work	100	12	4	8
	PC2.	demonstrate safe handling of bare fiber (broken ends of fiber and scraps)		14	6	8
	PC3.	read and comprehend manufacturer supplied MSDS for safe handling of fiber		12	4	8
	PC4.	demonstrate fire safety practices (whilst working with high voltage arc in fusion splicers)		12	4	8
	PC5.	demonstrate electrical safety norms where fiber is placed along with electrical cables		12	6	6
	PC6.	adhere to laser safety rules		12	8	4
	PC7.	demonstrate use of safety gloves and boots, in required situations		12	6	6
	PC8.	complete any health and safety records legibly and accurately		14	6	8
	TOTAL		100	44	56	