AFRICAN ADVANCED LEVEL TELECOMMUNICATIONS INSTITUTE (AFRALTI)

COURSE OUTLINE

Title:	**CERTIFIED FIBER OPTIC SPECIALIST, TESTING (CFOS/T) COURSE**
Duration:	**5 days**

Part One: Fiber Optics Testing Lectures

Course Outline:

Part One: Theoretical Training

Day	Main Topics	Sub Topics Lectures
Day One	Lecture 1: Fiber Optics Testing Overview.	1. Fiber Optics testing presentation • Mechanical tests • Geometrical tests • Transmission tests • Optical tests • Performance tests • Environmental tests
	Lecture 2: Fiber Test Instruments Overview	2. Familiarization with Instruments for Fiber Testing: • Fiber Tracer • Visual Fault locator • Optical microscope • Light Source • Power meter • Optical time Domain Reflectometer (OTDR) • Optical return loss meter • Spectrum Analyzer • Polarization Mode Analyzer • CD Analyzer • Bit Error Rate tester • Protocol Analyzer 3. Fiber Test Parameters

	Lecture 3: Fiber Impairments and test Parameters	• Continuity testing • Polarity testing • Visual tracing • Visual fault location • Splice verification • Connectors quality inspection • Connectors cleaning • Fiber identification • Power tests • Attenuation • Insertion loss tests • PMD Dispersion test
Day Two	Lecture 1: Fiber Safety:	**(a) General Fiber Safety Rules** Eye Safety and mandatory wearing of safety glasses • Invisible Laser Power • High power DWDM systems • Bare fibers and scraps • Safe disposal of fiber scraps • Working with chemicals, adhesives, Alcohol and flammable materials • Observance of MSDS • Working with sharp fiber tools, Arc welders fusion splicer, • Eating , drinking and smoking in FO lab **(b) Construction safety Rules** • safety glasses and dust coats • Safety boots, safety jackets, safety helmets with reflectors • fiber scraps and Fresnel • Dispose of fiber scraps safely • Only splice in a well-ventilated room • cleanliness- fiber has zero tolerance to dust • Bonding and grounding of metallic cables • Fire stopping
Day Two	Lecture 2: Fiber Optics Safety & Standards	**Familiarization with Fiber Safety standards** • TIA Standards TIA 568, ISO 11801, • ITU Standards: G.652, G 653, G.654, G.655, G. 657 • NECA/FOA 301-2016 Installation and Testing Standard for Fiber Optics (American)- A Soft copy shall be provided to trainees • Safety Poster

Part Two:
Hands on Training Syllabus

Day	Lab No	Task	Test Instruments	Training Activities
Day Three	1	**Connector Inspection with a Microscope**	1. Optical microscope 2. Patch cords with connectors at end	• Inspect several connectors on patch cords and pig tails with microscope • Look for scratches, dirt, breaks, dust, polishing defects • Clean a dirty connector

				• Evaluate performance of the clean connector
Day Three	2	**Visual Fault Location**	1. Visual Fault Locator (Laser) 2. Tracer (LED) 3. Patch cords of 2 meters 4. Cable of 10 meters 5. PC and APC Connectors	• Locate breaks in a fiber • Locate stress points on a fiber • Locate fiber bends • Identify high loss connectors • Identify splices • Identify fiber polarity on zip cord cables
Day Three	3	**Optical Power measurements**	1. Light Source 2. Power meter 3. Low loss Reference cables 4. Low loss Connectors 5. Patch cords 6. Cable to test.	• Transmit known optical power through a fiber (dBm) light source • Measure received power with power meter (dBm) • Calculate power loss (dB) • Compare with receiver sensitivity • Calculate loss margin • Document Results
Day Three	4	**Using Optical Power Meter**	1. Power Meter 2. Light Source	• Connect a source to a meter with an appropriate patch cable. • Set same wavelength on light source and power meter • Set the meter's calibration to the wavelength of the source. • Using the meter's dBm scale, measure the power in dBm. • convert that power to Watts.
Day Four	5	**Link Power budget Analysis**	1. Electronics calculator	Link Budget Analysis Exercises for: 1. Multimode campus LAN backbone. **2)** Multimode LAN link at 10G, **3)** Single mode long haul network, **4)** Single mode metro network link, 1310nm.
Day Four	6	**Insertion Loss testing**	1.Power meter 2. Light Source 3. Cable to test- 4. Launch reference cable- 5. Receive reference cable at least 500 meters 6. Mating Adapters 7. Fiber Tools Kit	• Single ended patch cord test method (FOTP-171) • Double ended loss test of a simulated cable plant ((OFSTP-14) and (OFSTP-7) • 3 cable reference test method (OFSTP-14) method C, TIA 568-C • Set zero dB reference levels • Measure receiver power • Measure connectors loss on both ends • Measure cable plant loss

				• Compare loss results with calculated Loss Budget • Calculate insertion losses for single, double and 3 cable test methods • Record results
Day Four	7	**OTDR Testing**	1. OTDR 2. Launch and receive cables (1 kilometer) pulse suppressor 3. Patch cords 4. Pig tails 5. Long single mode cable (1,000 meters or more) 6. Fiber Tools kit	• Measure length of launch cable • Make OTDR trace at 1310nm and 1550 nm • Identify fiber cuts, stresses, bends • Identify initial pulse • Identify dead zone • Measure connector loss, reflectance • Identify cable end • Identify Noise • Measure fiber length with OTDR • Measure cable plant loss end to end with OTDR • Measure fiber attenuation • Compare traces at 1310 nm and 1550 nm/1625 nm • Document Results • Interpret OTDR Test Results
Day Five	8	**Fusion Splicing and OTDR testing and link trouble shooting**	3. Fusion Spicer 4. Cleaver 5. Fiber striper 6. Cable cutter 7. Single mode cable 8. OTDR 9. Pig tails 10. Fiber Tools kit	• Strip and cleave two fibers • Splice two fibers • Measure splice attenuation • Make OTDR Trace • Measure cable plant Loss with OTDR • Measure splice loss with OTDR • Compare with Fusion splicer loss figure • Record Results & Interpret results
	9	**Revision Exercises**	Revise past examinations papers and do online tests	• Online tests
	10	**Examination**	Examination CFOS/T	• Written Examination

Administering of Test: Written CFOT Test (approx. 2 hours)

Reference materials

Textbook: Fiber Optics Reference Guide by Jim Hayes, Supplementary Study Materials includes Workbook and Lab Manual.

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