**INDIVIDUAL COURSE DETAILS**

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| **A.** Name of the Institute | UTL Technologies Limited |
| **B.** Name / Title of the Course | Certificate Course in Advanced Telecom Transmission Technologies (DWDM, FTTH and GPON) |
| **C.** Course dates and duration  in Weeks | **Batch 01: From:** 04-03-2019 To: 27-04-2019**Duration:** 08 Weeks |
| **D**. Eligibility criteria for participants **I.**  Educational Qualifications | Graduates / Engineers / Diploma Holders in Electronics / Electrical / Communications / Telecom or Equivalent with prior Telecom Knowledge |
|  **II.**  Work Experienced required if any | Prior work experience in relevant field is desirable |
|  **III.** Age Limit | Energetic professionals with a zeal and enthusiasm to learn and implement technologies |
|  **IV**. Target group  | Officials from ICT Ministry, Telecom Companies, Universities, Colleges, Telecom allied service companies etc. |
| **E.** Aim, Objectives of the Course | **Aim, Objective of the Course**: This course provides the participants with a comprehensive Knowledge on Planning, Designing, Implementing, Managing and Trouble Shooting DWDM, FTTH & GPON Networks. |
| **F.** Course Contents   | **Network Essentials:*** Network Architecture
* Internetworking Devices
* OSI, TCP/IP Model
* Network Addressing Design: IPv4/IPv6
* Ethernet Technologies
* MPLS Fundamentals

**Optical Fundamentals:** * Light theory
* Introduction to fiber optics
* Electromagnetic Spectrum
* Evolution of fiber, types of fiber, ITU-T Standards.
* Light sources & detectors, connectors like FC, SC, ST, LC, MU, Patch chords, Patch panel.
* Fusion and Mechanical Splicing, OTDR, Power meter.

**SONET/SDH, DWDM:*** Multiplexing techniques TDM & FDM.
* SDH architectures, STM-1, STM-4, STM-16, STM -64.
* SDH multiplexing & protection schemes.
* SONET layered Structure STS-N frame structures.
* SDH tester, E1 tester.
* Elements of WDM link, OADMs and ROADMs, regenerators and transponders.
* Types of amplifiers, EDFA, pre-Inline and booster.
* DWDM network design considerations, operating wave lengths, DWDM test & measurement, optical spectrum analyzer . Photonic networks and all optical networking
* Optical layer, optical routing and elements of all-optical networking
* ROADM - Reconfigurable Optical Add-Drop Multiplexing
* Coherent optical communications
* New optical modulation schemes for 40 G, 100Gb/s transmission
* DP-QPSK
* Use of Digital Signal Processing along with coherent optical systems to alleviate chromatic dispersion, polarization mode dispersion and OSNR impairments

**Overview of FTTX:*** Introduction to FTTx Access Networks
* What is a FTTX Access Network?
* The FTTH network environment
* FTTx networks architecture (FTTC, FTTH, FTTN, FTTD, FTTP)
* FTTH Topology and Technology
* Network Layers
* Open Access networks

**Passive Optical Networks:*** PON Principles & Benefits
* How Passive Optical Network is Economical?
* PON types (BPON / EPON / GPON)
* xPON comparison
* GPON vs. GEPON

**Building GPON Infrastructure Networks:*** G-PON basics
* GPON Network Elements
* Optical Line Termination
* Optical Network Unit (SFU, SBU, MDU, MTU)
* Optical Splitter
* Optical Distributions Frame (ODF)
* Power Budget Calculation
* GPON Standards & Infrastructure in-buildings
* GPON In-Building wiring
* GPON Elements In-Building
* Examples based on real installations GPON In-Building wiring
* GPON Elements In-Building
* Examples based on real installations Transmission Basics (GPON Multiplexing Architecture: GEM Port, TCONT, Allocid, ONU-id, Port-Id)
* Downstream and Upstream TDM Architectures
* GPON Stack
* Control and User Planes in GPON
* GPON Services: IPTV, VoIP and Internet, RF Services
* GPON System Management Mode: SNMP, TR-069 and
* OMCI scopes
* GTC Layer Main Functions
* GTC Frame Format: Downstream GTC frame, Upstream GTC burst, Upstream GTC frame: ONU bursts combination
* ONU state machine
* ONU status change: Activate, Deactivate, Disable
* ONU, POPUP
* PON Physical Parameters
* OMCC Channel Establishment

**Case Study**: Case study of UTL GOA Network will be given to participants**Industry Visit:** All the participants are taken to GOA Broad Band Network (GBBN) implemented by UTL and visit to UTL R & D Manufacturing facilities where the optical fiber equipment’s are designed and manufactured.  |
| **G.** Mode of evaluation of performance  of the ITEC participant | * Formative assessment on a Weekly / Topic wise, Summative at the end of the course
* Presentations by the participants on a weekly / fortnightly basis.
* LAB Experiments and scenarios to Analyze the participants practical knowledge
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