Level 6 Advanced Diploma in Routing & Switching (112)
151 Credits

Unit: Fibre Optic Technology **Exam Paper No.:** 5	**Guided Learning Hours:** 20 **Number of Credits:** 22
Prerequisites: Networking knowledge.	**Corequisites:** A pass or higher in Diploma in IP Routing or equivalence.
Aim: This unit prepare learners for careers in opto-electronics, including the design and application of systems for optical fiber communications, optical instrumentation, holography, image forming and processing, lasers and optical detection, as well as areas such as optical testing. The unit objectives are: individuals with analytical and technical abilities to work effectively in optical engineering or related fields; individuals capable of advancing successfully in optical engineering or related fields; individuals prepared for both team and leadership roles in optical engineering or related fields. The unit focuses on fiber optic communication systems technology including networks and peripherals. Topics include fiber optic technology, state-of-the-art networking systems, installation/repair of fiber optic systems, and testing equipment. This unit will introduce the basic principles of light, optical fiber, sources and detectors, connectors and optical fiber systems, and will include applications, demonstrations and experiments. Topics in geometrical optics include ray analysis of mirrors, lenses, prisms, and optical systems. Topics in physical optics include polarization, interference, interferometry, and diffraction. The unit explore optics through experiments in imaging, fiber optics, interferometry, diffraction, polarization, and laser beam propagation. This unit combines the physics and science of fiber optics with instruction on optical fiber transmission, cable construction, safety codes and industry standards. Learners will terminate and test multimode ST and SC connectors and will also be introduced to mechanical and fusion splicing and the OTDR.	
Required Materials: Recommended Learning Resources.	**Supplementary Materials:** Lecture notes and tutor extra reading recommendations.
Special Requirements: The course requires a combination of lectures, demonstrations, discussions, and hands-on labs.	

Intended Learning Outcomes:	**Assessment Criteria:**
1. Optical fiber related terms, technologies, fiber optics history, plus reference material and application for analog and digital multimedia.	1.1 Describe the history of fiber optics 1.2 Analyse fiber optic cable applications 1.3 Outline the fiber optic cable construction 1.4 Analyse fiber optic propagation modes 1.5 Describe fiber optic characteristics 1.6 Describe the different multimode and single mode fibre types 1.7 Analyse fiber optic termination accessories 1.8 Describe the reasons for splicing fiber optic cables 1.9 Outline fiber optic network design considerations 1.10 Analyse advantages and disadvantages of using fiber optic
2. How Fiber-optic cable is becoming an increasingly common replacement for traditional standard copper wire.	2.1 Explain fiber optic metric system 2.2 Analyse components of optical fiber 2.3 Analyse fiber performance specifications 2.4 Describe installation and termination tools 2.5 Describe fiber optic testing equipment
3. Why Optical fiber is used by many telecommunications companies to transmit telephone signals, Internet communication, and	3.1 Describe analog/digital signals 3.2 Analyse fiber optic transmitter sources 3.3 Outline fiber optic system performance

cable television signals and the lower attenuation and interference.	parameters 3.4 Examine and identify fiber specifications 3.5 Outline fiber optic cable types
4. Fiber connector structure, fiber optic connector types and the way to terminate fiber optic cable.	4.1 Describe the different fiber connectors 4.2 Analyse causes of connector/splice loss 4.3 Describe fibre optic connector types 4.4 Describe the termination procedures 4.5 Describe different fibre optic cable types
5. Why every fiber optic cable plant need to be tested for end-to-end continuity and outline Fiber Optic Test Procedures (FOTPs).	5.1 Describe the reasons for testing after cables are installed, spliced and terminated 5.2 Describe the process of measuring power 5.3 Describe the process of testing loss 5.4 Analyse how OTDRs work
6. Optical Network Design Implementation and the process of designing standard-compliant, reliable, and cost effective fiber optic networks.	6.1 Analyse and identify premises cable systems 6.2 Describe outside plant applications 6.3 Outline the different network communications media 6.4 Describe outside plant versus premises cabling 6.5 Analyse cabling route considerations 6.6 Demonstrate how to conduct a loss budget analysis 6.7 Examine the documentation process 6.8 Analyse safety and building codes
7. The international standards that defines the use of fiber-optic cable (single and multimode).	7.1 Discuss the functions of standards 7.2 Examine the TIA 568 standards 7.3 Examine the ISO/IEC International standards 7.4 Describe the different network cabling types 7.5 Describe the networking hardware
8. The international standard that defines the use of STP (shielded twisted pair) cable, and UTP (unshielded twisted pair) cable.	8.1 Analyse network architectures 8.2 Analyse UTP cable characteristics 8.3 Describe UTP termination process 8.4 Demonstrate how to install UTP cabling 8.5 Outline UTP cabling testing process
9. Fibre suitable deployments; overcoming the challenges of fiber deployment and advantages and disadvantages.	9.1 Explain the roles of fiber optic in a premises network 9.2 Describe fiber suitable for premises network
10. Why more and more networks are operating without cables.	10.1 Analyse different wireless networks 10.2 Describe wireless standards 10.3 Outline wireless design requirements
Methods of Evaluation: A 3-hour essay written paper with 5 questions, each carrying 20 marks. Candidates are required to answer all questions. Candidates also undertake project/coursework in Fibre Optic Technology with a weighting of 100%.	

Recommended Learning Resources: Fibre Optic Technology

Text Books	• Fibre Optics: And Glass Integrated Optics by Hans Bach and Dieter Krause ISBN-10: 3540585958 • Fibre Optics Communication: Key Devices by Herbert Venghaus and Norbert Grote ISBN-10: 364220516X • Optical Fibres and Fibre Optic Communication Systems by Subir Kumar Sarkar ISBN-10: 8121914590 • Fiber-Optic Communication Systems by Govind P. Agrawal. ISBN-10: 0470505117 • Optical Networks: A Practical Perspective by Rajiv Ramaswami, Kumar Sivarajan and Galen Sasaki. ISBN-10: 0123740924 • Introduction to Optical Communication, Lightwave Technology, Fiber Transmission, and Optical Networks by Lawrence Harte and David Eckard. ISBN-10: 1932813292
Study Manuals 	BCE produced study packs
CD ROM 	Power-point slides
Software