Program : **Diploma in Electronics Engineering / Electronics and Communication Engineering**	
Course Code : **5043A**	Course Title: **Optical Communication and Networking**
Semester : **5 / 5**	Credits: **4**
Course Category: **Program Elective / Elective**	
Periods per week: **4 (L:4, T:0, P:0)**	Periods per semester: **60**

Course Objectives:

- To discuss about Optical Communication as an essential component of modern Telecom Industry.
- To provide the students with the conceptual knowledge of Optical Fibre Communication and Networking.
- To introduce the basics of signal propagation through optical fibre and familiarize the components and devices used in Optical communication system.

Course Prerequisites:

Topic	Course code	Course Title	Semester
Fundamentals of Physics	1003 2003	Applied Physics I, II	1 & 2
Fundamentals of Analog Communication	3042	Principles of Electronic Communication	3

Course Outcomes:

On completion of the course, the student will be able to:

COn	Description	Duration (Hours)	Cognitive level
CO1	Outline the concept of light propagation in Optical Fiber	14	Understanding
CO2	Explain optical sources and optical detectors	16	Understanding
CO3	Describe optical transmission and reception	14	Understanding
CO4	Summarize optical fiber cables and connectors in networking	14	Understanding
	Series Test	2	

CO – PO Mapping:

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO1	2						
CO2	2						
CO3	2						
CO4	2						

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline:

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**Outline the concept of Light propagation in Optical Fiber**		
M1.01	Explain the fundamentals of optics	4	Applying
M1.02	Explain parameters of Optical fiber	4	Understanding
M1.03	Classify various types of Optical fibers	6	Understanding
Contents: Fundamentals of optics - Structure of Optical fiber - Principle of light transmission in a fiber (total internal reflection) - numerical aperture - acceptance angle - refractive index Various fiber types based on transmission mode and refractive index profile - different types of fiber materials(glass, plastic) - advantages and applications of optical fiber .			
CO2	**Explain optical sources and optical detectors**		
M2.01	Explain working principle of various optical Sources	4	Understanding
M2.02	Compare and contrast various optical sources	4	Understanding
M2.03	Illustrate working principle of various optical Detectors	4	Understanding
M2.04	Compare and contrast PIN and Avalanche photodiodes	4	Understanding
	Series Test – I	1	
Contents: **Optical Sources:** LED structure - surface emitting and edge emitting LEDs - modulation of LED - theory of laser action - absorption and emission of radiation, population inversion,			

stimulated emission - laser diode structure and radiation pattern.

Optical detectors: Principle of photo - detection - PIN photodiode - avalanche photodiode - Comparison

CO3	**Describe optical transmission and reception**		
M3.01	Describe working of optical amplifier	3	Understanding
M3.02	Explain different types of losses in Optical fiber.	3	Understanding
M3.03	Illustrate the working of Optical Transmitters and Receivers.	4	Understanding
M3.04	Explain Multiplexing Techniques used in Fiber optic communication system	4	Understanding

Contents:

Optical communication system - block diagram - basic concept of optical amplifiers - types of optical amplifiers - SOA - Raman - EDFA

Optical Transmitter (Block diagram) Transmission loss (absorption loss, linear and non-linear scattering loss, fiber bend loss)- intra and inter mode dispersion losses

Optical receiver - optical transceivers (block diagrams)- wavelength division multiplexing (WDM and DWDM)

CO4	**Summarize optical fiber cables and connectors in networking**		
M4.01	Describe splicing and joining of optical fiber	3	Understanding
M4.02	Explain the functions of Optical Couplers, Beam Splitters and Optical Modulators	4	Understanding
M4.03	Outline the Basic concepts in optical networking	4	Understanding
M4.04	Compare Broadcast-and-select Networks and Wavelength-Routed Networks	3	Understanding
	Series Test – II	1	

Contents:

Fiber connector and splicer, different types of fiber couplers - Directional coupler - principle and applications - optical isolators and circulators - beam splitters and optical modulators

WDM Networks - Broadcast-and-select Networks - Wavelength-Routed Networks-SDH-SONET.

Text / Reference:

T/R	Book Title/Author
T1	Fiber Optic Communication - Systems and Components / Vivekanand Mishra &Sunita P Ugale
T2	Introduction to Fiber Optics / Ajay Ghatak and K Thyagarajan
R1	Optical Fiber Communication /Gerd Keiser
R2	Optical Fiber Communication / John M Senior
R3	Optical Networks : A practical Perspective/ Rajiv Ramaswamy

Online Resources:

Sl.No	Website Link
1	https://brpaper.com/psbte/diploma/electrical/5/ofc
2	https://www.electronics-notes.com/articles/connectivity/fiber-optics/optical-fiber-telecommunications-basics.php
3	http://www.iitg.ac.in/psm/qip2015/material/Subir_Bandyopadhyay_Lecture1.pdf
4	https://lecturenotes.in/notes/24378-note-for-optical-communication-and-network-ocn-by-rajendra-shekhawat