

Program : Diploma in Electronics Engineering / Electronics and Communication Engineering	
Course Code: 5043E	Course Title: Telecommunication Networks
Semester: 5	Credits: 4
Course Category: Program Elective	
Periods per week: 4 (L:4 T:0 P:0)	Periods per semester: 60

Course Objectives:

- To provide the students with the conceptual knowledge of telecommunication networks.
- To provide the basic knowledge of wireless network and wired networks.
- To equip the students with the updation of the next generation wireless Technology (5G and 6G) and next generation optical networks.

Course Pre-requisites:

Topic/Description	Course code	Course Title	Semester
Basic Engineering Mathematics Principles		Mathematics I & II	1 & 2
Basics of Digital Electronics		Digital Electronics	3

Course Outcomes

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

CO	Description	Duration (Hours)	Cognitive level
CO1	Explain features and implementation of different generations of mobile Networks	18	Understanding
CO2	Outline the fundamentals of IEEE wireless technologies and introduction to fourth generation mobile networks	14	Understanding
CO3	Outline the fundamentals of Optical fiber networks	14	Understanding
CO4	Explain the features and architecture of FTTH networks	12	Understanding
	Series Test	2	

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
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	Explain features and evolution of cellular Networks from 1G to 3G		
M1.01	Summarize the concepts of Cellular Communication	5	Understanding
M1.02	Explain features and implementation of first- and second-generation mobile Networks	5	Understanding
M1.03	Outline different multiple access methods and differentiate between them	4	Understanding
M1.04	Explain about the enhancement of 2 nd - Generation mobile Technology.	4	Understanding
Evolution of Cellular Networks - Overview of Wireless Communication - Shannon-Hartley capacity theorem – Overview of Frequency Bands and Propagation properties - Cellular Network Organization - Frequency Reuse— Mobile Cellular Call Scenario -Handoff -Power Control- Multiple Access Techniques- FDMA, TDMA, SSMA, SDMA- First Generation Wireless Networks -Second Generation Mobile Networks: Global System for Mobile Communications (GSM) -Overview of General Packet Radio Service (GPRS) and EDGE – Outline of Third Generation Mobile Networks (UMTS).			
CO2	Outline the fundamentals of IEEE wireless standards and next generation mobile networks		
M2.01	Illustrate IEEE wireless standards	4	Understanding
M2.02	Outline the salient features of fourth generation wireless networks	4	Understanding

M2.03	Summarize the differences between LTE and LTE-A	3	Understanding
M2.04	Show the evolution and features of 5G	3	Understanding
IEEE Technologies and Next Generation Wireless Networks Concepts of Wi-Fi - Wireless LAN-802.11- Transmission Speeds and Standards - Overview and Applications of Bluetooth - Bluetooth Protocol Stack - Long Term Evolution (LTE) - Network Architecture and Interfaces - Voice and SMS over LTE -LTE-Advanced (3GPP Release 10) - Machine Type Communication and the Internet of Things - NB-IoT – Introduction to 5G - New Radio for 5G - Radio Network Evolution for 5G - Core Network Evolution for 5G – Concepts of 6G.			
	Series Test -1	1	
CO3	Outline the fundamental of optical Fiber Communication		
M3.01	Outline the fundamental of optical Fiber Communication	4	Understanding
M3.02	Summarize Optical Fiber, Optical sources and Optical Detectors	4	Understanding
M3.03	Explain OF Cable Laying and Splicing	3	Understanding
M3.04	Explain the concepts of DWDM	3	Understanding
Basics of optical fiber communication system: Fundamentals of optics - principle of light transmission in a fiber - total internal reflection – numerical aperture - acceptance angle - optical fibers - optical fiber types - Optical Sources and optical detectors - Optical fiber communication system – OF Cable Laying - OF Cable Splicing- basic concept of optical amplifiers – Concept of Dense wavelength division multiplexing (DWDM).			
CO4	Explain the features and architecture of FTTH networks and OWC		
M4.01	Describe features of Passive Optical Networks	3	Understanding
M4.02	Explain about Components of FTTH Network	3	Understanding
M4.03	Discuss the important aspects of FTTH Network Design	3	Understanding
M4.04	Outline the concepts of Optical Wireless Networks	3	Understanding
FTTH Networks and Concepts of Optical Wireless Networks: Introduction to Passive Optical Networks – Fiber to the Home Networks- Components of FTTH Network -Optical Network Terminal (ONT) and Optical Line Terminal (OLT) – Important aspects of FTTH Network Design -Designing of a sample FTTH network- Concepts of Optical Wireless Networks.			
	Series Test -2	1	

Text / Reference:

T/R	Book Title/Author
T ₁	From GSM to LTE-Advanced Pro and 5G- An Introduction to Mobile Networks and Mobile Broadband -Third Edition- Martin Sauter-John Wiley and Sons, Ltd., Publication
R ₂	Theodore S. Rappaport, 'Wireless Communication Principles and Practice', 2 nd Edn., Pearson Education India
R ₃	Optical Fiber Communication - First Edition - P Chakrabarti - McGraw Hill Education (India) Private Limited
R ₄	Optical Fiber Communications Principles and Practice - Third Edition - John M. Senior - Pearson Education Limited

Online Resources

Sl No	Website Link
1	https://www.3gpp.org/
2	http://www.3gpp2.org/
3	https://fiberconnectmena.org/
4	https://www.itu.int/
5	https://www.ftthcouncil.eu/