

Faculty of Engineering & Technology

Optical Networks

Information :

Course Code : COM 522

Level : Undergraduate

Course Hours : 3.00- Hours

Department : Specialization of Electronics & Communication

Area Of Study :

- Develop a critical understanding of the current stage of optical communication networks including some recent trends in research and development of new concepts in optical communication.
- Be aware of the propagation mechanisms of optical signals over optical fibers and the transmission characteristics of the optical fibers.
- Estimate the power and rise time budgets for an optical link.
- Understand the structure, function and the principles of operation of the main blocks comprising the optical network.
- Estimate the optical network performance

Description :

Introduction to optical networks, propagation of signals in optical fiber as well as transmission characteristics of optical fibers, basic building blocks (couplers, multiplexers, filters, optical amplifiers, transmitters, detectors, switches, and wavelength converters), Modulation and demodulation, transmission system engineering, Client layers of optical layer, WDM network elements and design, Control and management, Photonic packet switching, Design example

Course outcomes :

a. Knowledge and Understanding: :

1 -	Explain the basic features of communication networks.
2 -	Illustrate optical fibres communication
3 -	Recognize basic blocks {Optical filter, optical amplifier, couplers, switches, isolators, wavelength converters, etc.
4 -	Explain of network security.

b. Intellectual Skills: :

1 -	Analyze physical parameters of optoelectronic components to be used in a network.
2 -	Analyze physical layer of an optical network to find the bottleneck limiting the information capacity.
3 -	Estimate the power budget and rise time budget.
4 -	Analyse of an optical communication network.

c. Professional and Practical Skills: :

1 -	Design an optical link and simple optical networks.
2 -	Choose the appropriate network configuration and the main basic blocks.
3 -	Set-up the appropriate scheme to investigate the system performance.
4 -	Use software programs to design an optical comm. network.

d.General and Transferable Skills: :

1 -	Work in a self-directed manner
2 -	Work coherently and successfully as a part of a team in the Lab., projects, and assignments.
3 -	Manage time and meet deadlines.
4 -	Analyze problems and use innovative thinking in their solution.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Review of optical fiber communication	5	3	2
Introduction to optical communication networks	5	3	2
Structure, function, and specifications of the main optical and opto-electronic components used in optical networks{couplers, multiplexers, filters, optical amplifiers transmitters, detectors, switches, and wavelength convertors}	15	9	6
Modulation and demodulation	5	3	2
Transmission system engineering	5	3	2
Client layers of optical layer	5	3	2
WDM network elements and design	10	6	4
Control and management	10	6	4
Photonic packet switching	5	3	2
Design Example	10	6	4

Teaching And Learning Methodologies :

Lectures.
Tutorials.
Research assignments
Lab work and project
Analysis and Implementation of a specified project

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Final exam	40.00		
o Assignments	10.00		
o Lab Exper.	10.00		
o Mid-Term exams	30.00		
o Quizzes	10.00		

Course Notes :

Optical Communication Network by: Biswanath Mukherjee
McGraw-Hill, Jan 1, 1997

Recommended books :

OPTICAL COMMUNICATION AND NETWORKS by : M. N. BANDYOPADHYAY
PHI Learning, Feb 11, 2014