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FACULTY OF ENGINEERING & TECHNOLOGY

First Year Master of Engineering

Semester I

Course Code: 102430104

Course Title: Advances in Optical Communication

Type of Course: Program Elective I

Course Objectives: To understand the different kind of losses, signal distortion, SM fibres.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Internal		External		Total
Lecture	Tutorial	Practical		Theory	J/V/P*	Theory	J/V/P*	
3	0	2	4	30 / 15	20 / 10	70 / 35	30 / 15	150 / 75

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Introduction: Basic of OFC, Snell Law, Different Losses, dispersion, Properties of light sources, detectors and associated losses.	4
2	WDM Fundamentals: Optical devices for WDM communications, Long haul and metro WDM systems, WDM systems analysis, design and performance evaluation.	7
3	Optical Amplification: Doped Fiber Amplifiers, Semiconductor Optical Amplifiers, Raman Amplifiers, Optical Parametric Amplifier, Optical amplification in WDM communication systems.	8
4	Optical Fiber Propagation Effects: Chromatic and Polarization Mode Dispersion, Non-linear effects in optical fibers, Compensation (optically and electrically) of propagation effects.	9
5	Advanced Modulation Formats for Optical Communications: Advanced multiplexing (wavelength, time, polarization, code, etc...), Single carrier advanced formats (QPSK, m-QAM, OFDM), Multi-carrier formats (O-OFDM, Nyquist-WDM), Systems analysis and evaluation.	11

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						**R**: Remembering; **U**: Understanding; **A**: Application, **N**: Analyze; **E**: Evaluate; **C**: Create
R	U	A	N	E	C	
10	20	20	20	20	10	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1	Reinhold Noé, "Essentials of Modern Optical Fiber Communication", Springer Publication.
2	Michel E. Marhic, "Fiber Optical Parametric Amplifier, Oscillator and Related devices", Cambridge University Press.
3	P. C. Becker, N.A. Olsson, J.R. Simpson,"Erbium Dropped Fiber Amplifiers fundamental and technology", Academic Press Publication.
4	Michael Bass ,"Fiber Optic Handbook fiber, devices and systems for optical communication", Mc Graw hill Telecom Engg.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Ability to dimension and design WDM high bit-rate fiber optic communication systems.	**30**
CO-2	Ability to analyze, model and implement advanced optical communication systems.	**40**
CO-3	Ability to use optical communications simulation tools to assess the results obtained from theoretical studies.	**30**

List of Practicals / Tutorials:

1	Study and simulation of WDM channels with DPSK modulation.
2	Study and simulation of PM-QPSK with Phase- and Polarization Diversity Receiver.
3	Study and simulation of dual-carrier PM-QPSK (DC-PMQPSK) system.
4	Study and simulation of dispersion reduction technique with Fiber grating technology.
5	Study and analysis of co-pump and counter pumping technique in EDFA.
6	Study and evolution of performance of multi channel DWDM light-wave systems over a fixed dispersion map.
7	Study of multi channel CWDM 2.5 Gb/s system operating in the 1300 nm wavelength over a passive network.
8	Study and simulation of 10 Gb/s externally modulated 1550 nm DFB LASER transmitter over a 50 Km TWRS fiber.
9	Design and optimization of an optical fiber for both EDFA and Raman amplifiers.
10	Analysis of PIN direct detection receiver with optical preamplifier and evaluate eye diagram, Q factor and BER.

Supplementary learning Material:	
1	Scilab 6.1
2	Optilux , website : https://optilux.sourceforge.io/
3	NPTEL/ Swayam portal website: https://swayam.gov.in/nc_details/NPTEL

Curriculum Revision:	
Version:	**1**
Drafted on (Month-Year):	Apr-20
Last Reviewed on (Month-Year):	Jul-20
Next Review on (Month-Year):	Apr-22