COURSE CODE	COURSE NAME	L-T-P-C	YEAR OF INTRODUCTION
EC405	OPTICAL COMMUNICATION	3-0-0-3	2015

Prerequisite:
EC203 Solid State Devices. EC205 Electronic Circuits

Course objectives:

1. To understand the concept of light transmission through optical fibers.
2. To understand the concept of optical sources and detectors.
3. To understand the performance comparison of various optical transmission schemes.
4. To understand the working of optical components.
5. To understand the principle of operation of optical amplifiers.
6. To understand WDM technique.

Syllabus: Generallight wave system, advantages ,classification of light wave systems, fibre types , linear and non linear effects in fibres,Fibre materials, fabrication of fibres, Optical sources, LEDs and LDs Optical detectors, Optical receivers, Digital transmission systems, Optical Amplifiers, WDM concept, Introduction to free space optics, Optical Time Domain Reflectometer (OTDR).

Expected outcome:
At the end of the course, students will be able to:-

1. Know the working of optical source and detectors.
2. Compare the performance of various optical modulation schemes.
3. Apply the knowledge of optical amplifiers in the design of optical link.
4. Analyse the performance of optical amplifiers.
5. Know the concept of WDM
6. Describe the principle of FSO and LiFi.

Text Books:

1. Gerd Keiser: Optical Fiber Communications,**5/e**,McGraw Hill, 2013.
2. Mishra and Ugale,Fiberoptic Communication, Wiley ,2013.

References:

1. Joseph C. Palais – Fiber Optic Communications, 5/e Pearson, 2013.
2. John M Senior- Optical communications, **3/e**, Pearson, 2009.
3. Hebbar,Optical fiber communication, Elsavier,2014
4. Chakrabarthi,Optical Fiber Communicatio, McGraw Hill, 2015.
5. Mynbaev ,Scheiner, Fiberoptic Communication Technology,Pearson, 2001.
6. Bandyopadhay , Optical communicatoion and networks.PHI, 2014.
7. Khare, Fiber optics and optoelectronics, Oxford university press, 2013.
8. Subir kumar sarkar, Optical fibers and fiberoptic communication system,S Chand, 2012.
9. Keiser - Optical Communication Essentials (SIE), 1e McGraw Hill EducationNew Delhi, 2008
10. Arumugam, Optical communication and sensors,Anuradha publications, 2009.
11. T. L. Singal, Optical Fiber Communications Principles and Applications, Cambridge University Press, 2001

Course Plan

Module	Course content (42hrs)	Hours	Sem. Exam Marks

I	Generallight wave system, advantages,classification of light wave systems. Fibres: types and refractive index profiles, mode theory of fibres: modes in SI and GI fibres, linear and non linear effects in fibres, dispersion, Group Velocity Dispersion, modal, wave guide and Polarization Mode Dispersion, attenuation- absorption, bending and scattering losses.	8	**15**
II	Fibre materials, fabrication of fibres, photonic crystal fibre, index guiding PCF, photonic bandgap fibre, fibre cables. Optical sources, LEDs and LDs, structures, characteristics, modulators using LEDs and LDs. coupling with fibres, noise in Laser diodes, Amplified Spontaneous Emission noise, effects of Laser diode noise in fibre communications	7	
FIRST INTERNAL EXAM			
III	Optical detectors, types and characteristics, structure and working of PIN and AP, noise in detectors, comparison of performance. Optical receivers, Ideal photo receiver and quantum limit of detection.	6	**15**
IV	Digital transmission systems, design of IMDD links- power and rise time budgets, coherent Systems, sensitivity of a coherent receiver, comparison with IMDD systems. Introduction to soliton transmission, soliton links using optical amplifiers, GH effect, soliton-soliton interaction, amplifier gain fluctuations, and design guide lines of soliton based links.	8	**15**
V	Optical Amplifiers ,basic concept, applications, types, doped fibre amplifiers, EDFA, basic theory, structure and working, Semiconductor laser amplifier, Raman amplifiers, TDFA, amplifier configurations, performance comparison.	6	**20**
VI	The WDM concept, WDM standards, WDM components, couplers, splitters, Add/ Drop multiplexers, gratings, tunable filters, system performance parameters. Introduction to optical networks. Introduction to free space optics, LiFi technology and VLC.Optical Time Domain Reflectometer (OTDR) – fault detection, length and refractive index measurements.	7	**20**
END SEMESTER EXAM			

Question Paper

The question paper shall consist of three parts. Part A covers I and II module, Part B covers III and IV module, Part C covers V and VI module. Each part has three questions which may have maximum four subdivisions. Among the three questions one will be a compulsory question covering both modules and the remaining from each module, of which one to be answered. Mark patterns are as per the syllabus with maximum 50 % for theory and 50% for logical/numerical problems, derivation and proof.