



**Kadi Sarva Vishwavidyalaya**  
**Faculty of Engineering & Technology**  
 Electronics and communication Engineering  
 (Academic Year 2019-20)

<b>Subject Code: EC604-N</b>	<b>Subject Title: OPTICAL FIBER COMMUNICATION</b>
<b>Pre-requisite</b>	

**Course Objective:**

The educational objectives of this course are

- To present a problem oriented introductory knowledge of Optical Fiber Communication.
- To address the underlying concepts and methods behind Optical Fiber Communication.

**Teaching Scheme (Credits and Hours)**

Teaching scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
03	00	02	05	04	03	70	30	20	30	150

**Outline Of the Course:**

Sr. No	Title of the Unit	Hours
1.	Overview Of Optical Fiber Communications	05
2.	Optical Fibers : Structures, Wave Guiding And Fabrication	06
3.	Signal Degradation In Optical Fibers	06
4.	Optical sources & Photo detectors	10
5.	Power Launching & Coupling	08
6.	Optical receiver operation and transmission systems	06
7.	Optical Amplifiers and Components	07
		<b>48</b>

**Total hours (Theory): 48**

**Total hours (Lab): 32**

**Total hours: 80**



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**Detailed Syllabus:**

Unit No.	Topics	Lecture Hours	Weight age(%)
1.	<b>Overview Of Optical Fiber Communications :</b> Elements of an optical fiber transmission link, WDM concepts, Advantages of optical fiber link over conventional copper systems, applications of fiber optic transmission systems.	05	10
2.	<b>Optical Fibers : Structures, Wave Guiding And Fabrication</b> Basic optical laws and definitions, optical fiber modes and configurations, Mode theory, single mode and graded index fibers, Derivation for numerical aperture, V number, M modes Supported by step index fiber and GI fibers, fiber materials, fabrication and mechanical properties.	06	15
3.	<b>Signal Degradation In Optical Fibers</b> Attenuation, Types of losses, Signal distortion in the fiber.	06	10
4.	<b>Optical sources &amp; Photo detectors:</b> Topics from semiconductor physics, LEDs diode, LASER diodes. Principles of operation, PIN diode, Avalanche Diode.	10	25
5.	<b>Power Launching &amp; Coupling:</b> Source To Fiber Power Launching, Lensing Schemes, Fiber To Fiber Joints, Splicing, Optical Fiber Connectors.	08	10
6.	<b>Optical receiver operation and transmission systems :</b> Receiver operation, Eye diagrams, Coherent detection, Point –to-point link – system considerations, Link power budget.	06	15
7.	<b>Optical Amplifiers and Components:</b> Semiconductor optical Amplifier, EDFA, Raman Amplifier, Optical couplers, Optical add drop multiplexer (OADM), Optical circulators, attenuators, optical cross connects, wavelength converter.	07	15
	<b>Total</b>	<b>48</b>	<b>100</b>

**Instructional Method and Pedagogy:**

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.



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**Learning Outcomes:**

On successful completion of the course

The student can identify different areas of Optical Fiber Communication. Can find the applications of all the areas in day to day life. Can identify the operations, working, construction, material etc. aspects of LED characteristics, attenuation, NA, voice interface etc

**TEXT BOOKS:**

Optical Fiber Communications By: Gerd Keiser, 4<sup>th</sup> Edition (McGraw Hill international edition).

**REFERENCE BOOKS:**

Optical fiber communications principles and practice by: - Jhon M Senior (PHI)

**List of Experiments** (Not limited to following. Subject teacher may modify the same):

Sr. No.	Experiment Title
1.	To perform Digital transmission through the fiber optic cable.
2.	To perform Analog transmission through the fiber optic cable
3.	To perform V-I characteristics of the FO-LED and LASER
4.	To perform the transfer characteristics between the detector and source with simplex cable.
5.	To perform the attenuation in the give fiber optic cable
6.	To determine Numerical Aperture.
7.	To determine far field of LED.
8.	To determine the V-number of the photo diode.
9.	To perform the voice interface.
10.	To study of Intensity modulation technique using analog & digital input signal.
11.	To study frequency modulation on fiber optic link