FIBER-OPTIC COMMUNICATION SYSTEMS AND TECHNIQUES

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TYPE OF COURSE : Rerun | Core | UG
COURSE DURATION : 12 weeks (29 Jul'19 - 18 Oct'19)
EXAM DATE : 16 Nov 2019

INTENDED AUDIENCE : BE/B.Tech
PRE-REQUISITES : Fundamentals of Electromagnetic theory, Principles of Communication Systems, Programming in Matlab
INDUSTRIES APPLICABLE TO : Sterlite Technologies, Infinera, Comsol India, Matlab, Texas Instruments, Defense labs etc will be interested

COURSE OUTLINE :

Recent years have seen an exponential increase in demand for large bandwidth and high data rate applications. This is fuelled by rapid advances in fiber-optic communications which includes introduction of digital signal processing (DSP) algorithms combined with coherent detection. A thorough grounding in optical fibers and fiber-optic communications is necessary to communication engineers to address future needs of high data rate communications. Fiber-Optic Communication Systems and Techniques provides solid background in wide ranging topics of fiber-optics. The topics covered include modes of optical fibers, impairments in optical fiber channel, lasers and photodiodes, optical amplifiers, WDM components, and digital fiber-optic communications. Several latest advances in DSP for fiber-optic communications is emphasized.

ABOUT INSTRUCTOR :

Dr. K. Pradeep Kumar obtained his PhD from the Department of Electrical Engineering, IIT Madras working on Quantum Key Distribution in 2009. He has since been at the Department of Electrical Engineering, IIT Kanpur. His research interests include Quantum key distribution, signal processing for coherent optical communications, optical signal processing using nonlinear fibers, and fiber-optic modeling. He has published more than 50 papers in peer-reviewed journals and conferences.

COURSE PLAN :

Week 01 : Electromagnetic nature of light, Uniform plane waves, Boundary conditions
Week 02 : Reflection and transmission of waves at a boundary, Total internal reflection, Ray theory of dielectric slab waveguides, and optical fibers
Week 03 : Modal analysis of slab waveguides
Week 04 : Modal analysis of optical fibers (step and graded index), linearly polarized modes
Week 05 : Attenuation and dispersion in optical fibers, Concepts of spontaneous and stimulated emission of light
Week 06 : Optical sources: Lasers and LEDs
Week 07 : Optical amplifiers, Photodiodes
Week 08 : Noise in photodetectors, WDM optical Components
Week 09 : Analog and digital optical communications, Direct detection receivers
Week 10 : Coherent detection, Noises, Comparison of direct and coherent detection
Week 11 : DSP algorithms for coherent optical communications
Week 12 : Multiplexing techniques in fiber-optic communications