

ANNEXURE F

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY DESIGN AND MANUFACTURING (IIITDM) KANCHEEPURAM

INTRODUCTION OF NEW COURSE

Course Title	Optical Fiber Sensors	Course No	ELE558			
Specialization	ECE	Structure (LTPC)	3	0	0	3
To be offered for	UG/PG	Status	Core <input type="checkbox"/>		Elective <input checked="" type="checkbox"/>	
Faculty Proposing the course	Dr. Srijith K	Type	New <input checked="" type="checkbox"/>		Modification <input type="checkbox"/>	
Date of DAC		Members Present in DAC				
		External Members:	Prof. Balaji Srinivasan, IITM Dr. Arup Lal Chakraborty, IITGN			
Pre-requisite		Submitted for approval	44 th Senate			
Learning Objectives	Fiber Optic Sensors is intended to be a graduate level course that introduces the different types of fiber-optic sensing technologies and their applications in metrology, navigation, structural health monitoring and healthcare.					
Learning Outcomes	<p>At the end of the course, the learners are expected to do the following:</p> <ul style="list-style-type: none"> • To identify an appropriate fiber-optic sensing technique for a given problem • To understand the capabilities and performance limits of a given sensing system • To design the sensor system for a given application • To analyze the performance parameters of a given sensor system 					
Contents of the course <i>(With approximate break-up of hours)</i>	<p>Motivation for fiber optic sensors-Review of wave propagation in optical fibers - Optical receiver design - Noise in optical receivers (6)</p> <p>Sensor metrics: dynamic range, accuracy, precision, resolution, cross-sensitivity (2)</p> <p>Intensity modulated sensors: Typical system configurations - SNR improvement through averaging, filtering and lock-in techniques - Evanescent wave sensing, Gas sensing using Absorption Spectroscopy (7)</p> <p>Interferometric sensors: Typical system configurations - phase stabilization issues, coherence issues, rotation sensing using Sagnac interferometers and micro-ring resonators, Displacement/vibration sensing using Fabry-Perot resonators (7)</p> <p>Polarimetric Sensors - Faraday Effect - Current sensors - Highly birefringent PM fibers (2)</p> <p>Wavelength modulated sensors: Fiber Bragg gratings - Principles and characteristics - Interrogation techniques - Multiplexing FBG sensors - Structural health monitoring applications - Long period gratings - Biochemical sensing (9)</p> <p>Distributed fiber optic sensors: OTDR concept - SNR vs bandwidth tradeoff - dynamic range vs spatial resolution tradeoff - Distributed sensors based on Raman, Brillouin and Rayleigh scattering (9)</p>					
Text Book	Francis T.S. Yu, Shizhou Yin, Paul B. Ruffin, "Fiber Optic Sensors", 2/e, CRC Press, 2017.					
Reference Books	<ol style="list-style-type: none"> 1. Ginu Rajan, "Optical Fiber Sensors: Advanced Techniques and Applications", 1/e, CRC Press, 2015. 2. Z Fang, Ken K Chin, R Qu and H Cai, "Fundamentals of Optical Fiber Sensors", 1/e, Wiley Publications, 2012. 3. John Dakin and Brain Culshaw, "Optical Fiber Sensors", Artech House, 1/e, 1997. 4. A Othonos and K Kalli, "Fiber Bragg Gratings: Fundamentals and Applications in Telecommunications and Sensing", Artech House, 1/e, 1999. 5. K T V Grattan and B T Meggitt, "Optical Fiber Sensing Technology: Fundamentals", Springer US, 1/e, 2000 					