GUJARAT TECHNOLOGICAL UNIVERSITY

WIRELESS COMMUNICATION TECHNOLOGY (44)

ULTRA WIDEBAND COMMUNICATION

SUBJECT CODE: 2734404

M.E. 3RD SEMESTER

Type of Course: Major Elective-IV

Prerequisite: Fundamental knowledge of narrow band and wideband system

Rationale: The course aims at providing insight into Ultra wideband system design. It also to explore various issues related to Ultra Wideband design.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
				Theory Marks		Practical Marks				
L	T	P	C	ESE (E)	PA (M)	ESE (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2#	2	5	70	30	20	10	10	10	150

Contents:

Sr. No.	**Topics**	**Teaching Hrs.**	**Module Weightage**
1	Introduction to Ultra wideband Benefits of UWB,Applications, Challenges	**2**	**5**
2	UWB Channel Estimation and Synchronization: Channel Estimation at SubNyquist Sampling Rate, Performance Evaluation, Estimating UWB Channels with Frequency-Dependent Distortion, Channel Estimation from Multiple Band Low-Complexity Rapid Acquisition in UWB Localizers	**6**	**15**
3	Ultra Wideband Geolocation : Signal Model, Positioning Techniques Main Sources of Error in Time Based Positioning, Ranging and Positioning, Location-Aware applications	**4**	**10**
4	UWB Modulation Options: UWB Signaling Techniques,Data Mapping,Spectral Characteristics Data Mapping and Transceiver Complexity,Modulation Performance in Practical Conditions	**4**	**10**
5	Ultra Wideband Pulse Shaper Design: Transmit Spectrum and pulse Shaper,FIR Digital Pulse Design,Optimal UWB Single Pulse Design, Optimal UWB Orthogonal Plulse Design,Design Examples and Comparisons	**6**	**20**
6	Antenna Issues: Design Considerations,Antenna and Pulse versus BER Performance	**4**	**10**
7	Ultra Wideband Receiver Architecture: System Model, UWB Receiver related issues , TH-IR-UWB Receiver options	**4**	**15**
8	Ultra Wideband Channel Modelling: UWB Multipath propagation channel Modelling, Channel Sounding Techniques, UWB Statistical-Based Channel Modelling, Impact of UWB Channel on System Design	**6**	**15**

Reference Books:

1. Ultra Wideband Wireless communication by Huseyin Arslan,Zhi Ning Chen,Maria-Gabriella Di Benedetto, Wiley Publishers

Course Outcomes:

After learning the course the students should be able to understand the concept of Ultra Wideband. Students can fundamentally understood the concept that how Ultra Wideband system can be design and which issues will occur during the design

List of Experiments:

Based On Syllabus

Design based Problems (DP)/Open Ended Problem:

1. UWB Antenna analysis and design
2. UWB Pulse Shaper System analysis
3. UWB Low Noise Amplifier analysis and design

Major Equipments:

FHSS Software, T-Spice

List of Open Source Software/learning website: www.nptel.ac.in

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.