GUJARAT TECHNOLOGICAL UNIVERSITY

ELECTRONICS & COMMUNICATION (WIRELESS COMMUNICATION TECHNOLOGY) (44)

RECENT TRENDS IN MODERN WIRELESS COMMUNICATION ENGINEERING

SUBJECT CODE: 2724403

M. E. Semester – II

Type of course: Major Elective-III

Prerequisite: Basic Concepts of Wireless Communications

Rationale: Recent Trends in Modern Wireless Communication Engineering subject deals with the latest technology in wireless communication and The goal of subject is to inspire them for further research for current and next generation wireless communication technology

Teaching and Examination Scheme:

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

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	**Spread Spectrum Techniques (Single Carrier Modulation):** Spread spectrum modulation concept, Concept of SSM Bandwidth from Shanon's theorem and SNR, Operations related to PN Code or sequence, Various pseudo noise (PN) codes or direct sequences fundamentals, General block diagrams of DSSS transmitter and receiver, PN signal characteristics, Spectral density, Bandwidth and Processing gain, Mathematics associated with the spread spectrum modulation/demodulation, Direct sequence spread spectrum receiver considerations (Rake Receiver), Signal processing at the rake receiver, Characteristics of DSSS system. Frequency hoping spread spectrum transmitter and receiver, Time hopping, Comparison of spread spectrum modulation methods, Hybrid spread spectrum systems, Chirp spread spectrum	05	20%
2	**Orthogonal Frequency Division Multiplexing (Multi carrier Modulation):** Basic principles of orthogonality, Single vs multi carrier systems, OFDM block diagram and ITS explanation, OFDM signal mathematical representation, Selection parameters for modulation, Pulse shaping in	05	20%

	OFDM signal and spectral efficiency, Windowing in OFDM signal and spectral efficiency, Synchronization in OFDM, Pilot insertion in OFDM transmission and channel estimation, Amplitude limitations in OFDM, FFT points selection constraints in OFDM, CDMA vs OFDM, Hybrid OFDM, Other variants of OFDM		
3	**MIMO Systems:** Introduction, Space diversity and systems based on space diversity, Smart antenna system and MIMO, MIMO-Based system architecture, MIMO exploits multipath, Space-time processing, Antenna considerations for MIMO, MIMO channel modeling, channel measurement and channel capacity, Cyclic delay diversity (CDD), Space-time coding, Advantages and applications of MIMO in present context, MIMO applications in 3G wireless systems, MIMO-OFDM	05	15%
4	**Simulation of Communication Systems and Software Defined Radio:** Simulation and its need, Simulation methodology, Multidisciplinary aspects of simulation, modeling of the system, Deterministic simulation, Stochastic simulation, General steps of simulation, Some miscellaneous considerations for simulation, software-Defined Radio (SDR), Need for software radio, General structure of transceiver for SDR, 3G SDR system architecture, Present trends in SDR, Future of SDR, Cognitive Radio	05	15%
5	3G and 4G Wireless Standards:GSM,GPRS,WCDMA,LTE,Wi-MAX	05	15%
6	**Fourth Generation Systems and New Wireless Technologies:** Introduction, 4G vision, 4G Features and challenges, Applications of 4G, 4G Technologies	06	15%

Reference Books:

1. Wireless Communication By Upena Dalal, Oxford University Press

2. Wireless Communications and Networking By Vijay K. Garg, Morgan Kaufmann Publications

Course Outcome:

After learning the course the students should be able to understood the concept of Spread spectrum system and MIMO system. Students can also fundamentally understood the concept of Software defined Radio and current 3-G and 4-G system

List of Experiments and Open Ended Problems:

Based on Syllabus

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.