

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. (EC) (Wireless Communication Technology)
PROPOSED TEACHING SCHEME (W.E.F. July 2012)

Semester III

SR. No.	SUBJECT	TEACHING SCHEME(HOURS)			CREDITS
		THEORY	TUTORIAL	PRACTICAL	
	Major Elective IV	4	0	2	5
730401	RF laboratory	0	0	4	2
730001	Seminar	0	0	4	2
730002	Presentation of Literature Review	0	0	0	2
730003	Dissertation Phase-I	0	0	18	9
	TOTAL	4	0	28	20

Sr. No.	Major Elective - IV
734401	Software radio design
734402	Radio frequency identification

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Subject Name: RF laboratory

Subject Code: 730401

Sr_No	The RF lab may contain following experiments based on availability of Equipments:
1.	Spectral response of digital carrier systems
2.	Antenna radiation patterns
3.	Path loss measurement
4.	Simulation and modeling of RF systems
5.	Microwave measurements
6.	Antenna design using design tools
7.	Bandwidth measurement of CDMA and GSM carriers
8.	RF microelectronics design using VLSI tools
9.	Link Budget analysis for wireless systems
10.	Path loss models for RF communication system

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Subject Name: Software radio design

Subject Code: 734401

Sr_No	Content
1.	Introduction to Software Radio Concepts. The Need for Software Radios, What Is a Software Radio, Characteristics and Benefits of a Software Radio, Design Principles of a Software Radio
2.	Radio Frequency Implementation Issues. The Purpose of the RF Front-End, Dynamic Range: The Principal Challenge of Receiver Design, RF Receiver Front-End Topologies, Enhanced Flexibility of the RF Chain with Software Radios, Importance of the Components to Overall Performance, Transmitter Architectures and Their Issues, Noise and Distortion in the RF Chain, ADC and DAC Distortion.
3.	Multirate Signal Processing. Introduction, Sample Rate Conversion Principles, Poly-phase Filters, Digital Filter Banks. Timing Recovery in classical Analog Receiver, Timing Recovery in Digital Domain, Early-Late gate Synchronizer.
4.	Digital Generation of Signals. Introduction, Comparison of Direct Digital Synthesis with Analog Signal Synthesis, Approaches to Direct Digital Synthesis, Analysis of Spurious Signals, Spurious Components due to Periodic Jitter. Bandpass Signal Generation, Performance of Direct Digital Synthesis Systems, Hybrid DDS-PLL Systems, Applications of direct Digital Synthesis.
5.	Smart Antennas. Introduction, Vector Channel Modeling, Benefits of Smart Antennas, Structure for Beam Forming Systems, Smart Antenna Algorithms, Diversity and Space time Adaptive signal Processing, Algorithms for Transmit STAP, Hardware Implementation of Smart Antennas.
6.	Digital Hardware Choices. Introductions, Key Hardware Elements, DSP Processors, FPGA, Trade-offs in using DSPs FPGAs and ASICs, Power Management Issues , Combinations of DSPs , FPGAs and ASICs.
7.	Case Studies in Software Radio Design. Introduction and Historical Perspective, SPEAKeasy, Wireless Information Transfer System, Current Trends.

Text Book:

- (1) Software Radio: A Modern Approach to Radio Engineering By Jeffrey H. Reed Pearson Education Low Price Edition.

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Subject Name: Radio frequency Identification

Subject Code: 734402

Sr_No	Content
1.	Introduction History, Review of RF basics, RFID based system Architecture, Frequency band used by RFID, Comparison with bar codes
2.	Standards and Regulation Global regulatory requirements, Regional regulators requirements, ISO, ETSI, FCC, EPC safety regulations/ Issues
3.	RFID applications Supply chain, Asset tracking, Theft Reduction, Retail, Access control, Tolls, Military applications, others
4.	Tags Tag features, Comma types of tags, Passive and active chips, read only, read write, affixing Tags, selecting location to fix a Tag, Tag orientation and location, Tag stacking, Impact of rate of movement, Tag data formats. Approaches to RFID Tags, The players in the Industry, Active, Passive and semi active Tag, Antennas, Implementation, Protocols
5.	RFID readers Reading Zones, RFID Types, Relation to Various standards, Antennas, Read distance tests, Multiple readers, synchronization, Reading environments effects, collision and anti collision protocols, RFID peripherals
6.	Testing and trouble shooting Read rate problems, improperly tagged items, Tag Failure.
7.	RFID system design Antenna Types, Interference, Antenna Location and spacing, Multiple antennas, Multiple readers, Tag types, Grounding and considerations, Cabling, Site diagram
8.	Security safety and privacy Security of RFID tags, Safety Issues of privacy and excess to tag information, Impact on society at large, Misuse, Fraud

Reference books:

(1) Simon Garfinkel, Beth Rosanberg, RFID : Applications, Security and privacy,

Addison Wesley professional 2005

- (2) Dominique Paret, Roderick Riesco, RFID and contactless smart card applications,
John wiley and sons
- (3) Claus Heinrich, RFID and beyond : Growing your business through real world Awareness,
John wiley and sons
- (4) Stevens Shepard, RFID, Macgraw-Hill Professionals, 2004