



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
ET913	Embedded System	4	--	--	4	--	--	4
		Examination Scheme						
		Theory Marks						
		ISE		MSE		ESE		
		10	30		100 (60% Weightage)			

Pre-requisite Course Codes		Microprocessors and Microcontrollers
Course Outcomes	CO1	Understand Wireless Sensor Networks architecture and technology.
	CO2	Able to classify functions of WSN protocol stack.
	CO3	Understand various advanced architectures and programming models
	CO4	Able to partition Software and Hardware for a given application
	CO5	Able to understand and design communication protocols
	CO6	Able to model Real-Time signal processing for control applications

Module No.	Unit No.	Topics	Ref.	Hrs.
1		Introduction to Sensor Networks: Background of sensor network technology, sensor network architectural elements, design challenges,Technologies for wireless sensor network, sensor node technology, hardware and software, sensor taxonomy, Classification of Sensor Networks,Transmission Technologies for Sensor Networks.	7	07
2		WSN Protocol Stack: MAC Layer protocols, Routing Layer protocols,Transport control Protocols, High Level Application Layer Support, Adapting to the Inherent Dynamic Nature of WSNs, Cognitive Radio based sensor Networks. Nano Sensor Networks.	8,9	10
3		Architecture of embedded systems, Programming models for Single-Core and Multi-Core structures.Free RTOS Scheduling and Task Management – Real-time scheduling, Task Creation, Inter task Communication, Pipes, Semaphore, Message Queue, Signals, Sockets, Interrupts.	1,2	10
4		Software / Hardware partitioning - Co design overview - Co simulation, synthesis and verifications - Re-configurable computing - System on Chip (SoC) and IP cores - Low-Power RT Embedded Systems - On-chip Networking .	3	05
5		GPS, GSM, Bluetooth, Zigbee module interfacing, data processing and communication. IoT overview, IoT supported hardware platforms. RTOS for 1D Signal Processing and 2D Signal processing. RTOS for fault Tolerant Applications, and Control Systems.	4,5,6	10
Total				42



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References:

- [1] Frank Vahid and Tony Givargis, "Embedded System Design: A Unified Hardware/Software Introduction", John Wiley publication
- [2] Richard Barry, Using the FreeRTOS Real Time Kernel - a Practical Guide - Cortex-M3 Edition.
- [3] Andrew N Sloss, Dominic Symes, Chris Wright, "ARM System Developer's Guide - Designing and Optimizing System Software", 2006, Elsevier.
- [4] Communicating Embedded Systems: Networks Applications, Francine Krief (Editor) February 2010, Wiley-ISTE
- [5] P Marwedel, "Embedded System Design", Springer publication Christopher Hallinan
- [6] "Embedded Linux Primer: A Practical Real-World Approach", Second Edition, Pearson Education Publication
- [7] Kazem Sohraby, Daniel Minoli, and Taieb Znati, "Wireless Sensor Networks: Technology, Protocols, and Applications", Wiley Student Edition
- [8] "Adhoc Wireless Networks Architecture and Protocols" by C.Siva Ram Murthy and B.S.Manoj, Pearson.
- [9] Holger and Andreas Willig, "Protocols and Architectures for WSN", Wiley student edition