

# GUJARAT TECHNOLOGICAL UNIVERSITY

Electronics Engineering / Electronics & Communication  
Engineering / Electronics & Telecommunication Engineering

## B. E. SEMESTER: VII

Subject Name: **Embedded Systems (Department Elective - I)**

Subject Code: **171005**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
3	0	2	5	70	30	30	20

Sr. No	Course Content	Total Hrs.
1.	<b>Introduction:</b> Embedded system and general purpose computers, Embedded system components, Embedded System Design Process, Classification of an embedded system, Examples of an embedded system, Applications of an embedded system.	3
2.	<b>ARM Processor:</b> The Acorn RISC machine, Architectural inheritance, The ARM programmer's model, ARM development tools, ARM instruction set: Data processing instructions, Data transfer instructions, Control flow instructions, Conditional execution, ARM Condition codes, Software interrupt (SWI), Multiply instructions, Writing simple assembly language programs for ARM, 3-stage pipeline ARM organization, 5-stage pipeline ARM organization, Understanding of ARM instruction execution, Exceptions in ARM, Thumb programmer's model and instruction set	14
3.	<b>Device and Communication Bus:</b> IO types and examples, Serial communication devices, Parallel Device ports, Watch dog timer, Real time clock, Writing device drivers, Serial bus communication protocols, Parallel communication using ISA, PCI, PCI-X and advanced buses, Network protocols, Wireless and mobile system protocol.	08
4.	<b>Interprocess Communication and Synchronization of processes, Thread and Task:</b> Multiple process and thread in application, Task and Task state, Task	10

	control block, Task coding, Task scheduling, Semaphores, Semaphores for synchronization, Data sharing and deadlocks, Inter process communication, Sockets and remote procedure call.	
5.	<p><b>RTOS:</b></p> <p>Operating system service, Process management, Timer and Event function, Memory management, Device , File and I/O subsystem management, Interrupt routine in RTOS environment and handling of interrupt service calls, Basic design using RTOS, RTOS task scheduling models, Interrupt latency and response of tasks as performance metrics, OS security issue.</p>	10

**Reference Books:**

1. Embedded System: Architecture, Programming and Design by Rajkamal, TMH
2. ARM System on Chip Architecture by Steve Furber, Pearson Education
3. Computer as Components: Principles of Embedded Computing System Design, Wayne Wolf, Morgan Kaufmann Publication