GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 2

Electrical Engineering

Subject Name : Embedded system Design (Micro)

Sr.No	Course content
1.	Embedded system Introduction: Introduction to Embedded System, History, Design challenges, optimizing design metrics, time to market, applications of embedded systems and recent trends in embedded systems, embedded design concepts and definitions, memory management, hardware and software design and testing, communication protocols like SPI, SCI, I2C, CAN etc
2.	System Architecture: Introduction to ARM core architecture, ARM extension family, instruction set, thumb Instruction set, Pipeline, memory management, Bus architecture, study of on-chip peripherals like I/O ports, timers, counters, interrupts, on-chip ADC, DAC, RTC modules, WDT, PLL, PWM, USB etc.
3.	Interfacing and Programming: Basic embedded C programs for on-chip peripherals studied in system architecture. Need of interfacing, interfacing techniques, interfacing of different displays including Graphic LCD (320X240), interfacing of input devices including touch screen etc, interfacing of output devices like thermal printer etc., embedded communication using CAN and Ethernet, RF modules, GSM modem for AT command study etc.
4.	Real time Operating System Concept: Architecture of kernel, task scheduler, ISR, Semaphores, mailbox, message queues, pipes, events, timers, memory management, RTOS services in contrast with traditional OS. Introduction to uCOSII RTOS, study of kernel structure of uCOSII, synchronization in uCOSII, Inter-task communication in uCOSII, memory management in uCOSII, porting of RTOS.
5.	Embedded Linux Introduction to the Linux kernel, Configuring and booting the kernel, The root file system, Root file directories, /bin, /lib etc., Linux file systems, Types of file system: Disk, RAM, Flash, Network. Some debug techniques- Syslog and strace, GDB, TCP/IP Networking- Network configuration, Device control from user space- Accessing hardware directly, Multi processing on Linux and Inter Process Communication- Linux process model and IPCs,

	Multithreading using pThreads - Threads vs. Processes and pThreads, Linux and Real-Time- Standard kernel problems and patches., Device Driver Basics, Writing Device Driver, Boot loaders, configuring uBOOT for target, Kernel configuration, Linux Porting and Flashing, File System etc

Reference Books:

1. " Embedded sytem design " , PHI- Frank Vahid
2. " Embedded Sytems " TMH- Rajkamal
3. " Embedded systems software primer" Pearson- David Simon
4. "ARM System-on-Chip Architecture" Pearson- Steve Furber
5. " MicroC/OS-II" Indian Low Price Edition- Jean J Labrose