

GUJARAT TECHNOLOGICAL UNIVERSITY

POWER ELECTRONICS (29)

EMBEDDED SYSTEMS

SUBJECT CODE: 2722906

SEMESTER: II

Type of course: Major Elective-II

Prerequisite: Assembly and C language.

Rationale: PG Students of Power Electronics Engineering need to possess good understanding of the fundamentals and applications of Embedded System as it is an emerging field.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		Theory Marks		Practical Marks				
			ESE (E)	PA (M)	ESE (V)		PA (I)			
					ESE	OEP	PA	RP		
3	2#	0	4	70	30	30	0	10	10	150

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	Embedded Micro controller Cores, Embedded Memories, SRAM, DRAM Controllers.	5	12%
2	Embedded System Design Aspects, Custom single-purpose processor, General -purpose processor, standard single purpose processor, its basic architecture, operation and design.	5	12%
3	8051 micro-controller: Assembly language programming and C programming, instruction set, interrupts, timers, memory, I/O ports, serial communication, interfacing, keyboard, LED display, external memory, DC, DAC, LCD, RTC	6	16%
4	Real Time system: Introduction, interrupt driven system, context switching, scheduling, round robin primitive rate monotonic foreground and background systems, inter task communication, buffering data, semaphores-deadlock-process stack management, dynamic allocation, response time calculation, interrupt latency.	9	21%
5	RISC concepts, PIC (16F72) processor- architecture, elementary programming, interrupts, timers ,memory, I/O ports, SPI, I2C bus, A/D converter, USART, PWM, interfacing, Modems, USB, Introduction to JTAG Port	9	21%
6	DC motor speed control, speed measurement, temperature & stepper motor Control, PID control, Case study of Embedded Applications	8	18%

Reference Books:

1. Mazidi, "Embedded systems design using 8051 microcontroller", Pearson.
2. Frank Vahid and Tony Givargis, "Embedded system design", Wiley –India.
3. J. W. Valvo, "Embedded Micro computer system", Brooks.
4. Philip a Laplante, "Real time system design and analysis", PHI.
5. Lyla B. Das, "Embedded systems-An Integrated Approach", Pearson-2013.

Course Outcome:

After learning the course the students will be able to:

1. Understand the concept of embedded system design and its application in different design and product, Programming for Embedded System Design.
2. Understand architecture and functionalities of each block inside the processor
3. Get idea about working of processor and its application
4. Understand requirement of a project as well as inputs and outputs of the system
5. Understand multitasking environment and development tools
6. Design software for the target processor/controller
7. Interface peripherals with the board
8. Understand different communication protocols to make the system as a part of network

List of Open Source Software/learning website:

1. <http://www.freertos.org/>
2. <http://ecos.sourceforge.org/>
3. <https://www.kernel.org/>
4. <http://www.embeddedcraft.org/listrtos.html>
5. www.embedded.com

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