

GUJARAT TECHNOLOGICAL UNIVERSITY

ELECTRICAL ENGINEERING

B. E. SEMESTER: VII

Subject Name: **Advanced Microcontrollers & Embedded System**
(Department Elective-I)

Subject Code: **170907**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
4	0	2	6	70	30	30	20

Sr. No.	Course Contents	Total Hrs
1.	Advancement in 8051 Architecture 1. PCA timer and different modes of operation. 2. Use of watch dog timers in embedded systems. 3. UART and communication with PC.	08
2.	Serial Communication in Microcontrollers 1. SPI communication Protocol. 2. I2C Communication Protocol. 3. Interfacing of 8051 with SPI and I2C based devices like ADC,DAC,E2PROM and RTC(Real Time Clock)	10
3.	High-end microcontroller and it's peripherals 1. General architecture of CIP-51 family. 2. Crossbar configuration 3. PLL and clock frequency configuration. 4. SFR paging & memory management.	08
4.	Programming of CIP-51 Microcontroller 1. Programming of general purpose I/Os. 2. Programming of timers in different modes. 3. Programming of PCA timer in different modes 4. Use of on chip ADC – DAC and their programming.	14
5.	Embedded software Architecture 1. Survey of software architecture 2. Round robin 3. round robin with interrupts 4. functional queue scheduling 5. real time operating system.	08

6.	Introduction to Real Time Operating System (RTOS) 1. Tasks & Task-States. 2. Tasks & Data. 3. Semaphores & Shared Data.	08
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Suggested List of Experiments:

1. Programming of PCA timer for frequency measurement.
2. Programming of PCA timer as Square wave generator. (HSO Mode)
3. UART Programming.
4. Programming of SPI Port on 8051.
5. Programming of RTC using I2C Communication.
6. PWM Generation using PCA timer.(CIP-51)
7. Programming of GPIO (CIP-51).
8. Programming of Timers (CIP-51).
9. Programming of on-chip ADC (CIP-51).
10. Programming of on-chip DAC of CIP-51 for wave form generation

Reference Books:

1. “8051/52 MCU Architecture, Assembly Language & H/W Interfacing” by Creig Steiner, Universal Publishers.
2. “8051 MCU An Application Based Introduction” by Chris Braithwaite – Fred Cowan & Hassan Parchizadeh, Elsevier Publications.
3. “Embedded System Design With The C8051” by Han-Wayhuang, Cengage Learning.
4. “An Embedded Software Primer” by David E. Simon, Addison-Wesley Pearson Education.
5. Data Sheet of “89C51rd2xx” by NXP Semiconductors.
6. Data Sheet of “C8051F12x” by SI Labs.