

GUJARAT TECHNOLOGICAL UNIVERSITY

Subject Name: Protocols and Interfaces
Subject Code: 3725202

Semester II

Type of course: ME - Electronics & Communication Engineering (VLSI & Embedded Systems Design)

Prerequisite: Basic knowledge in microprocessors and microcontrollers

Rationale: NA

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
4	2#	0	5	70	30	30	20	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment;

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction (Recap) Basic concepts of computer organization. The stored program model. Classes of computer architecture. Processor vs. System architecture. Elements of computer systems – processors, memories, I/Os, disks, buses	6	10
2	Data Processing in Microcontrollers Programs based on data transfer, arithmetical, logical, branching, bit (Boolean) operation instructions	6	10
3	Organization communications of Microcontroller with the object of control Data Transfers between On-chip hardware Microcontroller and peripheral Units. Signal processing and conditioning. Timing Function conditioning. Software conversion of codes. Software support of A/D and D/A Converters	6	20
4	Interfacing with Microprocessor Systems Organization communications of Operator with Microcontroller. Keyboard and Display interfacing. Input/output enhancement mode	6	10
5	Protocols Types of memory interfaces – SRAM, DRAM, Flash, EPROM/ROM and corresponding protocols. Types of Disk protocols – SATA, IDE, SCSI Special memories – Video RAMs, RDRAM, CAM Interrupt controllers, priorities and arbitration. ISRs and context saving architectures. Programmable interrupt controller PCI, USB, 1394, Ethernet, 802.11x, PCI Express, ACPI Bridge functions Storage area networks and protocols	6	20

Reference Books:

1. Computer Architecture, A Quantitative approach by D.Patterson and J. Hennessy
2. Computer Organization by D. Patterson and J.Hennessy
3. Bus Specifications - PCI, PCIe, SCSI, IDE, USB, 802.11x, SATA

Course Outcome:

1. After learning the course the students should be able to:
2. Explain the fundamentals of computer organization.
3. Develop program to demonstrate the data processing in microcontroller.
4. Explain the interface between microcontroller peripherals.
5. Describe the user interface design for microcontroller based design.
6. Describe the concepts of interfacing protocols for various peripherals.

List of Experiments: (with Open Ended Problems)

1. Write a Program to initialize, Transmit and Receive the data on 8051 UART for data bits, 1 STOP bits, No parity & Asynchronous operation. The baud rate should be set at 9600baud with a system clock of 4MHz.
2. Develop a simple Embedded operating system with a dummy task. Analyze the performance improvement achieved by Your Simple embedded OS.
3. Write a fragment of C-code to declare an appropriate array & then fill the array with powers of 2 from 2^1 to 2^6 .
4. For the specifications given in Q.1, Implement the same on LPC2148 Microcontroller.
5. Write a Program to generate a software delay of 10ms. What is the minimum delay that can be generated?
6. Write a ASM Code to generate Binary count patterns on port P1.
7. Write a Program to generate a Hardware delay of 10ms.
8. Write a portable code to generate accurate delays of 50us, 100us & 500us for any oscillator frequency.
9. Write a portable code for switch debouncing where debouncing period can be varied.
10. Write a program to initialize I2C on LPC2148 & transfer a byte of data to EEPROM. (Implement the code with minimal number of states)

Major Equipments:

ARM board-lpc2148

List of Open Source Software/learning website:

Keil software

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