



Master of Science (Electronics)
M.Sc. (Electronics) Semester II

Course Code	PS02CELE52	Title of the Course	Microprocessor and Real Time Systems
Total Credits of the Course	4	Hours per Week	3+1 = 4 Hours

Course Objectives:	<ol style="list-style-type: none"> 1. To introduce students with the architecture and operation of X86 Platform microprocessor. 2. To familiarize the students with the programming and interfacing of X86 microprocessor 3. To provide strong foundation of designing real time operating system and embedded processor based real world applications.
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Course Content		
Unit	Description	Weightage* (%)
1.	Software Architecture of the 8086 microprocessor, Memory address space & data organization, Segment registers & memory segmentation, Dedicated & general use of memory, Instruction Pointer, Data Registers, Status Registers, Generating a memory address, The Stack, I/O address space, Addressing modes of 8086, Debug Program & Debug Commands. The 8086 Instruction set, Data Transfer, Arithmetic, Logic, Shift, Rotate, Flag Control, Compare & Jump Instructions, Subroutine & Subroutine handling Instructions, Loop & The Loop handling Instructions, String & The String handling Instructions, Examples.	25
2.	The 8086 Microprocessor Pin-out Diagram, Minimum & Maximum mode systems, Minimum system mode interface, Maximum mode system interface, System clock, BUS cycle, Memory interface, hardware organization of the memory address space, Memory bus status code, Memory control signals, Read & Write bus cycles, Demultiplexing the address/data bus, Program & Data storage memory circuits.	25
3.	Input & Output interface, I/O data transfers, Input & Output Instructions, Input & output bus cycles, Eight byte wide output Ports, Interfacing 8255A parallel ports at even & odd boundaries, Types of interrupts, Interrupt address pointer table, Masking of interrupts, External hardware interrupt interface & sequence, Software interrupts, Nonmaskable interrupts, Reset, Internal interrupt functions	25
4.	Real Time OS, Implementation, Classification of OS, Fundamentals of RTOS, RTOS Vs General OS, Task Scheduling, Fixed Time Switching, Inter-task Communication & Synchronization, Dynamic Memory Allocation, Application of RTOS, Architecture of Embedded	25





	Systems, RTOS Architecture. Programmable System on Chip (PSoC), Characteristics of PSoC, System Overview, PSoC CPU, Frequency Generator, Microcontroller Power Consumption, Reset, Digital & Analog I/O, Accessing Programmable Digital Blocks, PWM-LED-LCD-ADC interface using PSoC.	
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Teaching-Learning Methodology	Lectures, Seminars and tutorials, Independent study, Laboratory and Practical learning, Field trips, Problem-based/enquiry-based learning, Projects, e-learning
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Assess and solve binary math and logic operations using the microprocessor and explain the microprocessor's internal architecture and its operation within the area of manufacturing and performance.
2.	Apply knowledge and demonstrate programming proficiency using the various addressing modes and instructions of the X86 microprocessor.
3.	Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor
4.	Design electrical circuitry to the Microprocessor with memory and I/O ports in order to interface the processor to external devices.
5.	Design RTOS based Embedded processor applications for real world.

Suggested References:	
Sr. No.	References
1.	16-bit and 32-bit Microprocessors Architecture, Software and Interfacing Techniques Avtar Singh and Walter A. Tribble (Printice Hall, Englewood Cliff, N.J.,USA)





2.	The 8088 Microprocessor Programming, Interfacing, Software, Hardware & Applications Avtar Singh and Walter A. Tribble (Printice Hall, Englewood Cliff, N.J.,USA)
3.	The 8086 and 8088 Microprocessors Programming, Interfacing, Software, Hardware & Applications (Fourth Edition) Walter A. Tribble and Avtar Singh (Printice Hall of India Pvt. Ltd., New Delhi, INDIA)
4.	Real-Time Concepts for Embedded Systems Qing Li and Carolyn Yao, (CMP Books)
5.	Designer Guide to the Cypress PSoC Robert Ashby, (Elsevier Inc.)
6.	Microprocessor & Microcomputer based system design Mohamed Rafiquzzaman, (Universal Book Stall, New Delhi, INDIA)

On-line resources to be used if available as reference material

On-line Resources

<https://easyengineering.net/microprocessors-books/>

<https://www.cypress.com/>

https://userpages.umbc.edu/~squire/intel_book.pdf

