



SILVER OAK UNIVERSITY

College of Technology
Master of Technology
Electronics and Communication
Course Name: Embedded System
Course Code: 1010097237
Semester: 3rd

Prerequisite: Basic Knowledge of Microprocessor and Microcontroller

Course Objective:

1. This course introduces the difference between embedded systems and general- purpose systems.
2. It will provide optimize hardware designs of custom single-purpose processors and comparison between different approaches in optimizing general-purpose processors.
3. The students will able to understand the design tradeoffs made by different models of embedded systems.

Teaching Scheme:

Teaching Scheme				
L	T	P	Contact Hours	Credit
3	0	2	5	4

Content:

Unit No.	Course Contents	Teaching Hours	Weightage %
1	Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.	8	15
2	ARM Processor: The Acorn RISC machine, Architectural inheritance, The ARM programmer’s model, ARM development tools, ARM instruction set: Data processing instructions, Data transfer instructions, Control flow instructions, Conditional execution, ARM Condition codes, Software interrupt (SWI), Multiply instructions, Writing simple assembly language programs for ARM, 3-stage pipeline ARM organization, 5-stage pipeline ARM organization, Understanding of ARM instruction execution, Exceptions in ARM.	10	20

3	Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.	10	25
4	RTOS based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.	7	25
5	Serial Communication Interface: UART, SCI applications, Modern Serial Interface Standards, Modems, SPI, I2C, USB, Introduction to JTAG Port	6	15

Course Outcome:

Sr. No.	CO statement	Unit No
CO-1	Able to Understand the basics of an embedded system	1
CO-2	Able to write Program in embedded system	2
CO-3	Able to Design, implement and test an embedded system	3
CO-4	Able to understand the design tradeoffs made by different models of embedded systems.	4
CO-5	Able to introduce different peripheral interfaces to embedded systems.	5

Teaching & Learning Methodology: -

1. Flipped Classroom
2. Adaptive Teaching
3. Direct Instruction Methodology
4. Context based learning.
5. Kinesthetic Learning

List of Experiments/Tutorials:

Total Hours: 28

Sr. No.	Practical Name
1	To study about ARM IDE and Keil (MDK ARM).
2	To study about LPC 2148.
3	Write a C program to blink the LED connected on the Port Pin of LPC 2148.
4	Write a C program for LCD interfacing.To write a program to demonstrate external interrupt using switch and LED indication
5	Write a C program to generate 1 KHz frequency on Port P0.3 of LPC2148.
6	To write a program to demonstrate functioning of watch dog timer
7	Write a C program to transfer String 'SOCET' Serially, Continuously.
8	To write a program to display the corresponding key pressed on the LCD.
9	To write a program using U-COSII RTOS that create two tasks first task is LCD and second is Matrix Keyboard.The first task focuses on LCD and it continuously displays alphabets 'A' to 'Z'. This task focuses on the Matrix Keyboard. It is configured for the higher priority and it displays the key code on the LCD.
10	Create two Tasks, which will print some characters on the serial port, start the scheduler and observe the behavior.
11	Create three tasks and start the multitasking. Task1 This task display character 'A' to 'Z'. Task2 This task blinks the LED. Task3 This task Transmit the character on the serial port

Major Equipment:

ARM 7 kit.

Books Recommended: -

1. Embedded Systems - Raj Kamal, TMH.
2. Introduction to Embedded Systems - Shibu K.V, McGraw Hill.
3. Embedded Systems – Lyla, Pearson, 2013
4. An Embedded Software Primer - David E. Simon, Pearson Education
5. J. W. Valvo, Embedded Micro computer system, Brooks/Cole.
6. K. J. Ayala, The 8051 Microcontroller, Pernam Intl

List of Open Source Software/learning website:

Open source simulator for Verilog

- www.nptel.ac.in

- www.intel.com

- www.cpu-world.com

CO-PO Matrix:

CO No.	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P O 7	P O 8	P O 9	P O 10	P O 11	PO 12	PSO1	PSO 2
CO-1	3	3	-	-	3	-	-	-	-	-	-	-	3	-
CO-2	3	3	-	-	3	-	-	-	-	-	-	-	3	-
CO-3	3	3	3	-	-	-	3	-	-	-	-	-	3	-
CO-4	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO-5	3	3	-	-	3	-	-3	-	-	-	-	-	-	-