



K.S. SCHOOL OF ENGINEERING AND MANAGEMENT, BENGALURU - 560109

DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCE

SESSION: 2022-2023 (EVEN SEMESTER)

LESSON PLAN

NAME OF THE STAFF : Pavana H

COURSE CODE/TITLE : 21CS43/Microcontroller and Embedded Systems

SEMESTER/YEAR : IV/II

Sl. No.	Topic to be covered	Mode of Delivery	Teaching Aid	No. of Periods	Cumulative No. of Periods	Proposed Date	Delivery Date
MODULE 1							
1	Microprocessors versus Microcontrollers	L+D	BB	1	1	17/5/2023	17/5/23
2	ARM Embedded Systems: The RISC design philosophy	L+D	BB	1	2	18/5/2023	18/5/23
3	The ARM Design Philosophy	L+D	BB	1	3	19/5/2023	22/5/23
4	Embedded System Hardware	L+D	BB	1	4	23/5/23	23/5/23
5	Embedded System Software	L+D	BB	1	5	24/5/23	24/5/23
6	ARM Processor Fundamentals: Registers, Current Program Status Register	L+D	BB	1	6	25/2/23	25/2/23
7	Exceptions. Interrupts. Pipeline	L+D	BB	1	7	26/5/23	26/5/23

8	The Vector Table, Core Extension	L+D	BB	1	8	27/5/23	29/5/23
9	Practical: 1. Introduction to Kiel software Simple ALP programs to observe CPSR and registers.	Practical	D	3	3	29/5/23-41 22/5/23-02	24/5/23 25/5/23
10	Tutorial	L+D	BB	4	-	31/5/23 30/5/23	30/5/23 31/5/23
MODULE 2: Introduction to the ARM Instruction Set, C Compilers and optimization							
11	Introduction to the ARM Instruction Set : Data Processing Instructions	L+D	BB	1	9	1/6/23	1/6/23
12	Data Processing introduction, Branch instructions	L+D	BB	1	10	2/6/23	2/6/23
13	Software Interrupt Instructions, Program Status Register Instructions	L+D	BB	1	11	6/6/23	7/6/23
14	Coprocessor Instructions, Loading Constants	L+D	BB	1	12	7/6/23	14/6/23
15	Basic C data types	L+D	BB	1	13	8/6/23	15/6/23
16	C Looping structures	L+D	BB	1	14	9/6/23	16/6/23
17	Register allocation, Function calls	L+D	BB	1	15	13/6/23	20/6/23
18	Pointer Aliasing	L+D	BB	1	16	14/6/23	21/6/23
19	Practical: 1. Write a program to find the sum of first 10 integer numbers.	Practical	D	3	6		

	2. Write a program to find the factorial of a number. 3. Write a program to add an array of 16 bit numbers 4. Write a program to find the square of a number (1 to 10) using lookup table.								A1-26/5/23 A2-29/5/23	A-31/5/23 A2-11/6/23
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20	Tutorial	L+D	BB	4	-	16/6/23 22/6/23	21/6/23 22/6/23
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MODULE 3: C Compilers and Optimization, ARM programming using assembly language

21	Structure arrangement, Bit-fields	L+D	BB	1	17	29/6/23	23/6/23
22	Unaligned data and Endianness division	L+D	BB	1	18	24/6/23	23/6/23
23	Floating point, inline functions	L+D	BB	1	19	27/6/23	30/6/23
24	Inline assembl, portability issues.	L+D	BB	1	20	28/6/23	11/7/23
25	ARM programming using Assembly language: Writing Assembly code	L+D	BB	1	21	30/6/23	12/7/23
26	Profiling and cycle counting	L+D	BB	1	22	4/7/23	13/7/23
27	Instruction scheduling, Allocation	L+D	BB	1	23	5/7/23	14/7/23
28	Conditional Execution, Constructs	L+D	BB	1	24	6/7/23	18/7/23
29	Practical:	Practical		3	9	A1-9/6/23 A2-12/6/23	14/6/23 15/6/23

	<p>1. Write a program to find the largest or smallest number in an array of 32 numbers</p> <p>2. Write a program to arrange a series of 32 bit numbers in ascending/descending order</p> <p>3. Write a program to count the number of 1 and 0 in two consecutive memory locations.</p> <p>4. Display "Hello world" using internal UART</p>		D					<p>A1-16/4/23</p> <p>A2-26/6/23</p>	<p>8/7/23</p> <p>13/7/23</p>
30	Tutorial	L+D	BB	3	-		<p>7/7/23</p> <p>8/7/23</p>	<p>19/7/23</p> <p>20/7/23</p>	

MODULE 4: Embedded System components

	Embedded System Components: Embedded Vs General computing system	L+D	BB	1	25		11/7/23	25/7/23
31	History of embedded systems, Classification of Embedded systems	L+D	BB	1	26		12/7/23	26/7/23
32	Major applications areas & purpose of embedded systems	L+D	BB	1	27		13/7/23	27/7/23
33	Core of an Embedded System including all types of processor/controller	L+D	BB	1	28		14/7/23	28/7/23
34	Memory, Sensors, Actuators, LED, 7 segment LED display	L+D	BB	1	29		18/7/23	11/8/23
35	stepper motor. Keyboard.	L+D	BB	1	30		19/7/23	2/8/23

37	Push button switch, Communication Interface (onboard and external types)	L+D	BB	1	31	20/7/23	3/8/23	
38	Embedded firmware, Other system components	L+D	BB	1	32	21/7/23	3/8/23	
39	Practical: 1. Interface and control DC motor 2. Interface a stepper motor and rotate in clock wise and anti-clockwise 3. determine Digital output for analog input using ARM. 4. Interface a DAC and generate triangular and square waveforms	Practical	D	3	12	A1-23/9/23	19/7/23	
						A2-3/7/23	20/7/23	
						A1-10/7/23		
						A2-19/7/23		
40	Tutorial	L+D	BB	1	-	22/7/23 25/7/23 26/7/23	4/8/23 8/8/23 4/8/23	
MODULE 5:RTOS and IDE for embedded System Design								
41	Operating system basics, types of OS	L+D	BB	1	33	27/7/23	9/8/23	
42	Task, Process and threads	L+D	BB	1	34	28/7/23	16/8/23	
43	Multiprocessing and multitasking	L+D	BB	1	35	3/8/23	17/8/23	
44	Task communication, synchronization issues	L+D	BB	1	36	4/8/23	18/8/23	
45	Concept of binary and counting semaphores	L+D	BB	1	37	8/8/23	22/8/23	
46	Embedded system development and environment-block diagram, disassembler	L+D	BB	1	38	9/8/23	23/8/23	

47	Simulator, emulator, debugging techniques	L+D	BB	1	39	10/8/23	24/8/23
48	Target hardware debugging, Boundary scan	L+D	BB	1	40	11/8/23	25/8/23
49	<ol style="list-style-type: none"> Interface a 4x4 keyboard and display the key code on an LCD Demonstrate the use of external interrupt to toggle an LED on/off Display the HEX digits 0 to F on a 7 Segment LED interface with delay Demonstrate of IOT applications by using Aurdino. 	Practical	D	3	15	24/7/23 14/8/23 21/8/23 28/8/23	22/7/8/23 A2-24/5/23 A1-30/6/23 A2=31/8/23
50	Tutorial	L+D	BB	2	-	16/8/23 17/8/23	30/8/2023 31/8/2023
51	Revision	L+D	BB	2	-	18/8/23 31/8/23	1/9/23 4/9/23 5/9/23

Week		Remarks
Assignment 1	4 th Week	
Assignment 2	6 th Week	

Mode of Assignment – Written Assignment

Total No. of Lecture Hours = 40

Total No. of Tutorial Hours = 15
Total No. of Practical Hours = 20

Parvati
Course in charge

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