SAHYADRI
COLLEGE OF ENGINEERING & MANAGEMENT
An Autonomous Institution
MANGALURU

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21CS42

Fourth Semester B.E. Degree Examination, Apr/May 2023

Embedded System Concepts with ARM

Time: 3 hrs. **Max. Marks: 100**

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Q. No.		Questions	Marks	BL/CO
		Module I		
1	a.	Explain the major application areas of the Embedded system.	8	CL2/CO1
	b.	Explain the classification of embedded systems based on generation and based on complexity and performance requirements.	7	CL2/CO1
	c.	With a neat block diagram, explain the design and working of the washing machine.	5	CL2/CO1
		OR		
2	a.	With the Finite state model, Explain the design and operation of the automatic tea/coffee vending machine.	8	CL2/CO1
	b.	Explain the fundamental issues in hardware software co design	6	CL2/CO1
	c.	Explain the different "Embedded firmware design approach" in detail.	6	CL2/CO1
		Module II		
3	a.	Explain the Data flow model of the ARM core with a neat diagram.	8	CL2/CO2
	b.	Illustrate various fields of the Current Program Status Register.	7	CL3/CO2
	c.	Compare microcontroller and microprocessor	5	CL2/CO2
		OR		
4	a.	Explain the ARM Registers used under various modes.	8	CL2/CO2
	b.	Illustrate ARM pipeline Instruction sequence with an example.	7	CL3/CO2
	c.	Differentiate between RISC and CISC Processor.	5	CL2/CO2
		Module III		
5	a.	Explain the different data processing instructions in ARM.	8	CL2/CO3
	b.	Explain different barrel shifter operations.	7	CL2/CO3
	c.	Write an ALP to find the Largest Number in an array of 32-bit numbers	5	CL3/CO3
		OR		
6	a.	Explain Instruction scheduling with respect to ARM Processor	8	CL2/CO3
	b.	Explain Load- Store Multiple Instructions with respect to i) Single Register Transfer ii) Multiple register Transfer	7	CL2/CO3

	c.	Write an ALP to count the number of ones and zeros in two consecutive memory location	5	CL3/CO3

Module IV				
7	a.	With a neat interface diagram, illustrate the connection of master and slave devices on I2C bus	8	CL2/CO4
	b.	Write a program to interface Matrix Keyboard. with a neat diagram explaining its working.	12	CL3/CO4
OR				
8	a.	Write a program to interface the stepper motor through the driver circuit to the microcontroller. Explain it s working with a neat diagram.	12	CL3/CO4
	b.	Explain RS-232 C & RS-485 external communication Interfaces.	8	CL2/CO4
Module V				
9	a.	Define Task, Process and Threads, Explain the process structure, process states, and state transitions.	8	CL2/CO5
	b.	Illustrate the architecture of operating system using suitable diagram.	7	CL3/CO5
	c.	Differentiate between multi-processing and multitasking	5	CL2/CO5
OR				
10	a.	Explain the role of IDE in embedded software development	8	CL2/CO5
	b.	Illustrate the sequence of operation for embedding the firmware with a device programmer	7	CL3/CO5
	c.	Write a short note on boundary scans and simulators.	5	CL2/CO5

Cognitive Levels of Bloom's Taxonomy

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create

Course Outcomes

CO1	Describe the characteristics and quality attributes for designing an embedded system.	CL2
CO2	Illustrate the architectural features of ARM controller with assembly language program	CL3
CO3	Develop programs using Instruction Set Architecture of ARM controller.	CL3
CO4	Interface the peripheral devices with LPC2148 microcontroller.	CL3
CO5	Demonstrate the real time operating system by using VXWorks and Lynx OS.	CL3