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| **USN** |  |  |  |  |  |  |  |  |  |  | **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.***

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| **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 | CL2/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 | CL2/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 | CL2/CO3 |
| **OR** | | | | | |
| **6** | | a. | Explain Instruction scheduling with respect to ARM Processor | 8 | CL2/CO3 |
| b. | Explain Load- Store Multiple Instructions with respect to   1. Single Register Transfer 2. Multiple register Transfer | 7 | CL2/CO3 |
| c. | Write an ALP to count the number of ones and zeros in two consecutive memory location | 5 | CL2/CO3 |

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| **Module IV** | | | | |
| **7** | a. | With a neat interface diagram, illustrate the connection of master and slave devices on I2C bus | 8 | CL2/CO4 |
| b. | Explain Matrix Keyboard Interfacing with neat diagram. | 7 | CL2/CO4 |
| c. | Write short notes on the following  i)GPRS ii) USB iii) Actuators iv) Firewire | 5 | CL2/CO4 |
| **OR** | | | | |
| **8** | a. | With a neat diagram explain the interfacing of stepper motor through driver circuit to microcontroller. | 8 | CL2/CO4 |
| b. | Explain RS-232 C & RS-485 external communication Interfaces. | 7 | CL2/CO4 |
| c. | Write short notes on the following  i)Oscillator ii) Brown out protection circuit. | 5 | CL2/CO4 |
| **Module V** | | | | |
| **9** | a. | Define Task, Process and Threads, Explain the process structure , process states and state transistions. | 8 | CL2/CO5 |
| b. | With neat diagram, explain operating system architecture | 7 | CL2/CO5 |
| c. | Differentiate between multi-processing and multitasking | 5 | CL2/CO5 |
| **OR** | | | | |
| **10** | a. | Explain the role of IDE for embedded software development | 8 | CL2/CO5 |
| b. | Write a note of message passing | 7 | CL2/CO5 |
| c. | Write a short note on boundary scans and simulators. | 5 | CL2/CO5 |

**Cognitive Levels of Bloom’s Taxonomy**

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

**Course Outcomes**

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| CO1 | Describe the characteristics, quality attributes for designing an embedded system. | CL2 |
| CO2 | Illustrate the architectural features of ARM controller. | CL3 |
| CO3 | Use Instruction set architecture of ARM controller to develop programs. | CL3 |
| CO4 | Interface the peripheral devices with LPC2148 microcontroller. | CL3 |
| CO5 | Demonstratethe real time operating system by using case studies. | CL3 |