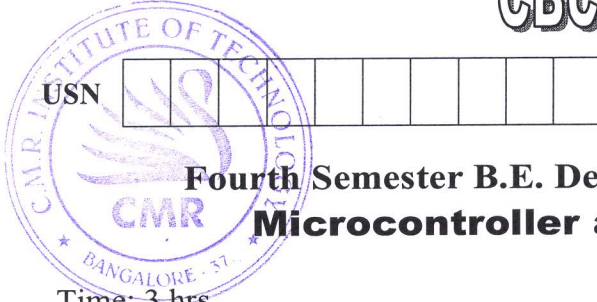USN | | | | | | | | | |

18CS44

Fourth Semester B.E. Degree Examination, Feb./Mar. 2022
Microcontroller and Embedded Systems

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1   a. Explain ARM core dataflow model and mention the different registers of ARM processor.
    (07 Marks)
    b. Differentiate between CISC and RISC, and explain the four major rules of RISC design.
    (08 Marks)
    c. With the help of basic layout diagram, explain the current program status register.   (05 Marks)

OR

2   a. With a neat block diagram, explain typical ARM based Embedded System.   (07 Marks)
    b. Explain the different operating modes of ARM processor.   (07 Marks)
    c. What is pipeline in ARM? Explain the different pipeline stages of ARM9 processor.
    (06 Marks)

Module-2

3   a. With example, explain the following ARM instructions.
       i) MOV   ii) MVN   iii) ADC   iv) RSC   v) BIC.   (10 Marks)
    b. Explain the different branch instructions of ARM processor.   (05 Marks)
    c. Explain the multiply instructions of ARM processor.   (05 Marks)

OR

4   a. Explain the different barrel shifter operations with suitable examples.   (06 Marks)
    b. Write a note on Instruction scheduling.   (06 Marks)
    c. Write a C program that prints the squares of the integers between 0 to 9 using function and explain how to convert this C function to an assembly function.   (08 Marks)

Module-3

5   a. Explain the various purposes of embedded systems in detail.   (07 Marks)
    b. Explain the role of different types of memories used in embedded system.   (07 Marks)
    c. Explain Little Endian and Big Endian architecture.   (06 Marks)

OR

6   a. With a neat interface diagram, illustrate the connection of master and slave devices on I^2C bus.   (07 Marks)
    b. With a neat diagram, explain the interfacing of stepper motor through the driver circuit to microcontroller.   (07 Marks)
    c. Explain the classification of embedded systems based on generation and based on complexity and performance requirement.   (06 Marks)

Module-4

7 a. List all the operational and non-operational quality attributes of an embedded system and explain any one operational quality attribute. **(07 Marks)**
   b. Explain the different communication buses used in automotive application. **(07 Marks)**
   c. Compare C with embedded C and complier with cross complier. **(06 Marks)**

OR

8 a. Design and explain FSM model for Tea/Coffee vending machine. **(08 Marks)**
   b. Explain how assembly language source file is translated to machine language object file. **(06 Marks)**
   c. Explain the fundamental issues in Hardware – Software Co – design. **(06 Marks)**

Module-5

9 a. Define Task, Process and Treads. Explain the process structure, process states and state transitions. **(08 Marks)**
   b. With a neat diagram, explain operating system architecture. **(07 Marks)**
   c. Differentiate between Multiprocessing and Multitasking. **(05 Marks)**

OR

10 a. Explain the role of Integrated Development Environment (IDE) for embedded software development. **(06 Marks)**
   b. Explain the functional and non-functional requirements for selecting RTOS for an embedded system. **(06 Marks)**
   c. Write a note on :
      i) Boundary scan
      ii) Simulators. **(08 Marks)**

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