CBCS SCHEME

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)**

* * * * *