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18CS44

Fourth Semester B.E. Degree Examination, Dec.2024/Jan.2025
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. Differentiate between RISC and CISC processors. **(06 Marks)**
    b. Explain ARM core data flow model, with neat diagram. **(08 Marks)**
    c. Explain ARM registers used under various modes. **(06 Marks)**

OR

2   a. Explain the architecture of a typical embedded device based in ARM core, with a neat diagram. **(08 Marks)**
    b. Explain the various fields in the current program status register. **(06 Marks)**
    c. Discuss the following with diagram :
        i)   Von Neuman architecture with cache.
        ii) Harvard architecture with TCM. **(06 Marks)**

Module-2

3   a. Explain Barrel Shifter Operation, with neat diagram. **(06 Marks)**
    b. Write an ALP using instruction to find out the factorial of a given number. **(07 Marks)**
    c. Write a program to add an array of 16 bit numbers and store the 32 bit result in internal RAM using ARM instructions. **(07 Marks)**

OR

4   a. Discuss the Load store instructions with respect to single register transfer along with various addressing modes. **(10 Marks)**
    b. Write an ALP program to multiply two 16 bit numbers. **(05 Marks)**
    c. With example, explain the Swap Instructions. **(05 Marks)**

Module-3

5   a. Differentiate between :
        i)   Microprocessor and Microcontroller.
        ii) Little Endian and Big Endian architecture. **(08 Marks)**
    b. With neat block diagram, explain the elements of embedded system. **(06 Marks)**
    c. Mention the application of embedded system with example of each. **(06 Marks)**

OR

6   a. Explain the different On board communication interfaces in brief. **(08 Marks)**
    b. Write a note on :
        i)   Reset circuit   ii)   Watch dog timer. **(06 Marks)**
    c. Explain how program memory are classified. **(06 Marks)**

Module-4

7 a. Explain the Operational and non operational attributes of an embedded systems. (10 Marks)
   b. Explain the different 'Embedded firmware design' approach in detail. (10 Marks)

OR

8 a. With a neat block diagram, explain design and working of Washing Machine. (10 Marks)
   b. With FSM model, explain the design and operation of automatic tea/coffee vending machine. (06 Marks)
   c. Explain Super loop based approach of embedded firmware design. (04 Marks)

Module-5

9 a. Define Process. Explain in detail the Structure of Memory Organisation and State transitions of the process. (10 Marks)
   b. Explain Multithreading , Multiprocessing and Multitasking. (10 Marks)

OR

10 a. Explain with neat diagram, the concept of 'Dead lock' and mention the different conditions which favour a dead lock situation. (10 Marks)
   b. With neat diagram, explain i) Binary Semaphore   ii) Counting Semaphore. (10 Marks)

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