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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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