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18CS44

Fourth Semester B.E. Degree Examination, Jan./Feb. 2021

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 the Barrel Shifter Operation in ARM processor, with neat diagram. (06 Marks)
- b. Discuss the load store instruction with respect to :
 - i) Single Register Transfer
 - ii) Multiple Register Transfer. (08 Marks)
- c. Write the short notes on :
 - i) Register Allocation
 - ii) Allocation variables to register numbers. (06 Marks)

OR

- 4 a. Write an ALP using ARM instruction to find the factorial of a given number. (06 Marks)
- b. Explain Instruction scheduling with respect to ARM Processor. (10 Marks)
- c. Show the post condition when MOVs instruction shifts register r1 left by one bit and result is stored in r0. Where $r0 = 0 \times 00000000$, $r1 = 0 \times 80000004$ and CPSR = nzcqvqIf. (04 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)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

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. Explain the concept of 'deadlock' with a neat diagram. Mention the different conditions which favour a dead lock situation. (10 Marks)
b. Write a note on Message passing. (10 Marks)

OR

- 10 a. Explain Multiprocessing , Multitasking and Multi programming. (10 Marks)
b. Define Process. Explain in detail the structure , Memory organization and State transitions of the process. (10 Marks)

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