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21CS43

Fourth Semester B.E. Degree Examination, June/July 2024
Microcontroller and Embedded System

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. What are the RISC and CISC machine? Explain the major design rules that are implemented with RISC machine. (08 Marks)
- b. Briefly explain the various fields in current program status register. (06 Marks)
- c. List the differences between microcontroller and microprocessor. (06 Marks)

OR

- 2 a. Explain ARM based embedded system hardware components. (08 Marks)
- b. What is pipeline in ARM? Explain the pipeline stages of ARM7 and ARM9. (06 Marks)
- c. Describe the various modes of operation of ARM processor. (06 Marks)

Module-2

- 3 a. Explain the barrel shifter operation in ARM processor with diagram. Illustrate with example for logical left shift operation. (08 Marks)
- b. Explain the following instructions with syntax and example:
 (i) MOV (ii) BIC (iii) RSB (06 Marks)
- c. Explain with example forward and backward branch in ARM processor. (06 Marks)

OR

- 4 a. Explain the syntax of LDRH and STRH instructions. Write an ALP to add an array of 16 bit numbers and Store the result in RAM. (08 Marks)
- b. List the addressing methods used for stack operations of ARM processor. Explain STMFD instruction of ARM processor. (06 Marks)
- c. Write a short note on :
 (i) C-looping structure (ii) Pointer Aliasing with respect to ARM processor. (06 Marks)

Module-3

- 5 a. What are in-line functions and inline assembly? Explain with example. (08 Marks)
- b. Explain the allocation of variables to register number with respect to ARM processor. (06 Marks)
- c. Write a short note on Profiling and Cycle counting. (06 Marks)

OR

- 6 a. How to convert C-functions to an assembly function? Explain by considering a simple C program that prints the square of the integer from 0 to 9. (08 Marks)
- b. Explain in detail the instruction scheduling with respect to ARM processor. (06 Marks)
- c. Write a short note on unaligned data and Endianness with respect to ARM. (06 Marks)

Module-4

- 7 a. What is an embedded system? Explain any four purposes of embedded system with examples. (08 Marks)
- b. Explain any two on board serial communication interfaces in brief. (06 Marks)
- c. What are the different types of memories used for program storage in an embedded system design? (06 Marks)

OR

- 8 a. Explain the role of Real Time Clock (RTC) and Watch Dog Timer circuit in embedded system. (08 Marks)
- b. Explain the classification of embedded system with example. (06 Marks)
- c. Explain the role of Application Specific Integrated Circuits (ASICs) on embedded system design. (06 Marks)

Module-5

- 9 a. Explain in detail the structure, memory organization and state transition of the process. (08 Marks)
- b. What is deadlock? Briefly explain the different conditions which favours a deadlock situation in an operation system. (06 Marks)
- c. Explain hard Real Time and Soft Real Time operating system with examples. (06 Marks)

OR

- 10 a. List the various hardware debugging tools used in embedded product development and explain Boundary Scanning approach. (08 Marks)
- b. Briefly explain the role of Integrated Development Environment (IDE) for embedded software development. (06 Marks)
- c. Write a short note on message passing. (06 Marks)
