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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 lift 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)**

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