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10EC74

Seventh Semester B.E. Degree Examination, Dec.2013/Jan.2014

Embedded System Design

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Explain: i) Embedded system, ii) Hard RTS, iii) Watch Dog Timer, with an example for each. **(06 Marks)**

b. With a block diagram, explain briefly the various components in a microprocessor based embedded system. **(06 Marks)**

c. Differentiate between the two design approaches for an embedded system development. Explain the various stages with a flow diagram. **(08 Marks)**

2 a. Compare:
i) Big Endian and Little Endian formats.
ii) RISC and CISC registers.
iii) Truncation and rounding errors. **(06 Marks)**

b. Explain direct and register indirect addressing modes with diagrams. Also write the timing diagram for a serial write operation with an 8 bit register. **(06 Marks)**

c. Write the block diagram of RTN model for a microprocessor data path and memory interface. Also explain fetch, execute and next control operations with RTL instructions. **(08 Marks)**

3 a. Explain the internal diagram of SRAM and write the timing diagram for read operation. **(06 Marks)**

b. Explain associative mapping cache implementation. **(06 Marks)**

c. Write the inside and outside diagrams for DRAM along with read and write operations. Also explain refresh operation. **(08 Marks)**

4 a. Write the flow diagrams for waterfall and V life cycle models and briefly explain Waterfall steps. **(06 Marks)**

b. Explain the characterizing and identifying the requirements of a system with respect to a digital counter. **(06 Marks)**

c. Write the hardware architecture and data and control flow diagram of a counter system and explain briefly the flow diagram. **(08 Marks)**

PART – B

5 a. Differentiate between:
i) Program and process;
ii) Processes and threads;
iii) Lightweight and heavy weight threads **(06 Marks)**

b. Describe:
i) Reentrant code,
ii) Foreground/background system,
iii) Multithreading system. **(06 Marks)**

c. Describe the task state transition with a diagram and TCB structures. Explain the function of the scheduler and also dispatcher. **(08 Marks)**

6 a. Explain any 6 functions of an operating system in brief. **(06 Marks)**

b. Describe virtual model and high level model for OS architectures. **(06 Marks)**

c. Write the algorithm for a simple OS Kernel, using C language notation for 3 asynchronous tasks using TCBs only. The 3 tasks use a common data buffer for read, increment and display operations. **(08 Marks)**

7 a. Write the Amdahl's law limitation for performance improvement/optimization. Consider a system with the following characteristics.

i) The task to be improved takes 200 time units and the gral is to reduce the execution time to 160 time units. The algorithm under consideration takes 80 time units. Determine the unknown parameter value in the equation and write the inference.

ii) If the goal is to reduce the execution time to 100 time units for the values in case(i), then determine the value unknown parameter value in the equation and write the inference. **(06 Marks)**

b. Write a 'C' function to determine the sum of the elements in an array and analyze it line by line for its time complexity **(06 Marks)**

c. Explain the Big-O notation used for comparing the algorithms, common bounds used with a table, graph and rules used for Big-O arithmetic. **(08 Marks)**

8 a. Write and analyze a linear search algorithm for its time complexity. **(06 Marks)**

b. The operation to be performed is (i) c = a + b, (ii) c = d +e if a = = b else c = d – e. Write the C language construct and assembly language statements for the above 2 cases separately and calculate the total time required if PUSH/POP takes 800 nsec, arithmetic operation/load/store/cmp takes 400 nsec and the conditional/unconditional branch takes 700 nsec. **(06 Marks)**

c. Describe memory loading with equation, figure and an example. **(08 Marks)**

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