Seventh Semester B.E. Degree Examination, June/July 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.   What is an embedded system? What is the purpose of a watchdog timer in an embedded application?   **(05 Marks)**
   b.   Briefly describe the major elements of the embedded system development life cycle.
                                                                                        (06 Marks)
   c.   Explain the implementation of a microprocessor based embedded system.   **(05 Marks)**
   d.   What is the difference between hard, firm and soft real time system?   **(04 Marks)**

2   a.   Explain the block diagram of a digital signal processor.   **(05 Marks)**
   b.   Draw and explain the architecture of the data path and the memory interface for a simple microprocessor at the register transfer level.   **(06 Marks)**
   c.   What is meant by the array of an instruction? Explain the terms one, two, three operand instruction.   **(04 Marks)**
   d.   What do you mean by addressing mode? What are different instructions in an instruction set view?   **(05 Marks)**

3   a.   Discuss the benefits of using SRAM versus DRAM. In what kind of embedded system applications should the following types of ROM used: ROM, PROM, EEPROM, FLASH?
                                                                                 (06 Marks)
   b.   Explain the direct mapping cache management strategy with an example. What are the trade off between write through and delayed write algorithm?   **(08 Marks)**
   c.   A microprocessor based system has 8 address lines and 8 data lines requires an SRAM system that can store up to 4K 16 bit words. But largest available memory device is 1K × 8. Design memory system that supports above said data.   **(06 Marks)**

4   a.   Briefly explain waterfall, V cycle, spiral life cycle models.   **(10 Marks)**
   b.   What are the general software design steps? Explain the hardware architecture of the counter in designing a counter system.   **(10 Marks)**

PART – B

5   a.   Explain the different functions of embedded operating system.   **(10 Marks)**
   b.   What is a task control block? What are some of the major components of task control block?
                                                                                (05 Marks)
   c.   Explain the time management system of real time operating system.   **(05 Marks)**

6   a.   Explain the operating system architecture.   **(05 Marks)**
   b.   Briefly explain the state transitions in the task control block module system.   **(05 Marks)**
   c.   What is a foreground/background system? What is the difference between a foreground and a background task?   **(05 Marks)**
   d.   What is context switching? Describe the sequence of steps that are necessary to handle an occurrence of an interrupt.   **(05 Marks)**

7 a. Describe the methods by which we can perform a time loading analysis of an embedded a time loading analysis of an embedded application. Discuss the advantages and disadvantages of each. **(10 Marks)**

   b. Analyze the algorithm given below that accepts as I/P an array of integer and the number of elements in the array. Obtain complexity function for the algorithm.

```
int total (int myArray[ ] , int n)
{
   int sum = 0;
   int  i = 0;
   For (i = 0; i < n; i++)
   {
      sum = sum + myArray[i];
   }
   return sum;
}
```
   (10 Marks)

8 a. Explain the difference between linear, quadratic, logarithmic and exponential growth with respective to a software algorithm. **(10 Marks)**

   b. Analyse the following two types of loop:
   i) Determine the number of iterations to be performed.
   ii) Determine the number of steps per iteration of total time.

   loop 1   loop 2
   int sum = 0;   int sum = 0;
   For (int j = 0; j < N; j++)   For (int j = 0; j < 100; j++)
   sum = sum + j;   sum = sum + j;

   (10 Marks)

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