10EC74

Seventh Semester B.E. Degree Examination, Jan./Feb. 2021
Embedded System Design

Time: 3 hrs.

Max. Marks:100

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

PART – A

1 a. With a neat flow chart, explain the embedded system development process. **(10 Marks)**
   b. Describe with neat block diagram a microprocessor based embedded system. **(10 Marks)**

2 a. What are the different computing engines available in embedded system? Explain each in detail. **(10 Marks)**
   b. A microprocessor support 144 instructions and has 256 registers. Write the instruction format using 32 bit instruction register for 1–adderss, 2–adderss and 3–adderss instruction using big endian and little endian format. **(06 Marks)**
   c. Write the c-code and assembly code to compare two numbers. If the two numbers are equal then perform addition of another two different variables are perform the subtraction operation using time different variables. **(04 Marks)**

3 a. Develop SRAM interface to microprocessor to store 4K words of 8bits, assuming that the largest memory device is of 1K of 8bit. Show detail design of the memory interface to microprocessor. **(06 Marks)**
   b. Explain the internal diagram of DRAM and also explain read, write and refresh operation in DRAM. **(08 Marks)**
   c. Describe direct mapping technique in cache with example. **(06 Marks)**

4 a. Explain with neat diagram :
     i)   Waterfall model
     ii) V-cycle model
     iii) Spiral model. **(12 Marks)**
   b. Describe the role of system design specification in embedded system. **(08 Marks)**

PART – B

5 a. What is an operating system? Identify and explain the responsibility of an operating system. **(06 Marks)**
   b. Explain the major states of task in an embedded system. **(08 Marks)**
   c. Write the differences between :
     i)   Single thread and multiple threads
     ii) Process and threads
     iii) Foreground and background tasks. **(06 Marks)**

6 a. Write 'C' program to model simple kernel that perform three jobs namely bringing data, perform computation and display data, use array to model the queue. **(10 Marks)**
   b. What is TCB? Explain the major components of TCB. **(06 Marks)**
   c. What are the different kinds of stacks that are found in embedded system? Explain in brief. **(04 Marks)**

7   a.   Write a 'C' function to find a factorial of a number. Analyze the complexity and write the complexity function.   **(10 Marks)**

       b.   What is time loading? Explain the methods to compute the time.   **(10 Marks)**

8   a.   For the following C–code given, write the assembly language equivalent and analyze the execution time. The time required to execute different operation are push/pup in 600ns, arithmetic operation in 500ns, load/strobe/compare operation in 400ns, and conditional/unconditional branch operations in 800ns.

          i) int a = 10 ;
            int b = 10 ;
              c = a + b ;

          ii) If (a = = b)
              c = d + e ;
            else
              c = d – e

          iii) While (myvar < 10)
             {
             i = i + 2 ;
             myvar ++ ;
             }   **(10 Marks)**

       b.   Discuss the optimization of power consumption in embedded system.   **(10 Marks)**

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