Code No: 07A7EC38 **R07** **Set No. 2**

IV B.Tech I Semester Examinations,November 2010
EMBEDDED AND REAL TIME SYSTEMS
Common to Bio-Medical Engineering, Instrumentation And Control Engineering

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain how pipes are useful for inter-task communication.
   (b) Explain the following with examples.
      i. How to create a pipe
      ii. How to open a pipe. [8+8]
2. Explain the impact of complexity of the logic on logic synthesis. [16]
3. (a) What are the advantages of USB over RS232?
   (b) Give the broad specifications of Bluetooth standard. [8+8]
4. (a) Show how using the process create and join semantics one can emulate the procedure call semantics of a sequential programming model.
   (b) List three requirements of real-time systems and briefly describe each of them. Give examples of actual real-time systems to support your arguments. [8+8]
5. (a) Explain about context switching with examples.
   (b) Explain about the following scheduling algorithms
      i. Round -Robin
      ii. Non primitive multitasking. [8+8]
6. (a) Explain the steps in developing Applications using Real Time Operating System.
   (b) Compare and contrast RTOS Vs LINUX. [8+8]
7. What are the various stages involved in microprocessor's execution of instructions? Explain with any four distinct examples. [16]
8. Draw the functional blocks of the following Embedded Systems and briefly explain them.
   (a) A Digital Camera
   (b) A Process Control System
   (c) Multimeter
   (d) A Handheld Computer. [16]

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Code No: 07A7EC38 **R07** **Set No. 4**

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EMBEDDED AND REAL TIME SYSTEMS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. (a) Explain the difference between pre-emptive and non-pre-emptive operating systems.
   (b) What are the objects of Operating System Kernel. [8+8]
2. Write short note on the following hardware units used to build Embedded Systems.
   (a) Microcontrollers
   (b) Microprocessors
   (c) DSP Processors. [5+5+6]
3. Write short notes on the following with reference to RTOS?
   (a) Message Queues
   (b) Mail Boxes
   (c) Pipes. [6+5+5]
4. Briefly explain the following semaphore variants
   (a) Counting Semaphores
   (b) Resource Semaphores
   (c) Matex Semaphores. [6+6+4]
5. Describe the elevator UnitControl state machine as per the program shown below, using the FSMD model definition <S, I, O, V, F, H, s0>. In other words, list the set of States (S), set of inputs (I) and so on. [16]

```
#define IDLE                0
#define GOINGUP             1
#define GOINGIN             2
#define DOOROPEN            3
Void UnitControl ()         {
        int state = IDLE;
        while (1) {
            switch (state)      {
                IDLE : up=0; down=0; open=1; timer_start=0;
                    if (req==floor)         {state = IDLE; }
                    if (req > floor)        {state = GOINGUP;}
```

```
                    if (req < floor)            {state = GOINGON;}
                break;
                 GOINGUP: up=1; down=0; open=0; timer_start=0;
                    if (req > floor)            {state = GOINGUP;}
                    if (!(req > floor))         {state = DOOROPEN;}
                break;
                GOINGON: up=1; down=0; open=0; timer_start=0;
                    if (req < floor)            {state = GOINGON;}
                    if (!(req < floor))         {state = DOOROPEN;}
                break;
                DOOROPEN: up=0; down=0; open=0; timer_start=1;
                if (timer < 10)                 state = DOOROPEN;
                if (!(timer < 10))              state = IDLE;
                break;
            }
        }
    }
```

6. (a) Explain about the role of Null Modem Cable Connection in connecting two RS232 ports.

   (b) Explain briefly about RS422/RS485 and differentiate between RS485 and RS232. [8+8]

7. Explain with an example how an embedded controller modeled by an FSM is Converted to gates. [16]

8. (a) What is a design metric?

   (b) List a pair of design metrics that may compete with one another, providing an intuitive explanation of the reason behind the competition? [4+12]

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Code No: 07A7EC38 **R07** **Set No. 1**

IV B.Tech I Semester Examinations,November 2010
EMBEDDED AND REAL TIME SYSTEMS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. (a) Explain how inter-task synchronization can be done through Mailbox.
   (b) With suitable examples explain how to
      i. Create Mailbox
      ii. Delete a Mailbox. [8+8]
2. (a) Explain about the issues involved in synchronization of data between the hand-held computers and desktop computers.
   (b) Explore the standardization activities for data synchronization. [8+8]
3. Write short notes on the following:
   (a) Shared data problems among RTOS tasks
   (b) Reentrant functions in RTOS. [8+8]
4. (a) What is flip flop? Explain Master - Slave flip flop.
   (b) Explain about RT - Level sequential components and sequential logic design. [4+12]
5. (a) Write a small program in Embedded C that reads a file of integers and outputs their sum
   (b) Write a 'C' program that does not add the integers using built-in addition Operator of a programming language, but instead simulates addition by using an Addition function that converts each integer to a string of 0's and 1's, adds the String, Mimicking binary addition and converts binary results to an integer.
   (c) Compare the performance of native program to the performance of the simulator Program in a large file. [6+5+5]
6. (a) Define the following terms : finite - state machines, concurrent processes, real - time systems and real-time operating systems.
   (b) Explain about Synchronization among Processes. [8+8]
7. Create a table listing the address spaces for the following address sizes:
   (a) i. 8 - bit
      ii. 16 - bit

iii. 24 - bit
iv. 32 - bit

(b) Expalin the following
i. Data path
ii. Control unit. [2+2+2+2+4+4]

8. Explain about Ethernet LAN Protocol Architecture and give brief description about each protocol. [16]

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Code No: 07A7EC38 **R07** **Set No. 3**

IV B.Tech I Semester Examinations,November 2010
EMBEDDED AND REAL TIME SYSTEMS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain about processor technology.
   (b) Define what is meant by the "Mythical man-month".
   (c) Draw basic architecture of general purpose processor. [8+3+5]
2. (a) Explain priority inversion problem.
   (b) List some real-time applications for which desktop computers cannot be used. [8+8]
3. (a) Explain using State Machines in Embedded Systems.
   (b) Explain about Finite - State Machine with Datapath model. [8+8]
4. (a) Draw and Explain briefly about each signal for Ethernet Interface.
   (b) Give notes on Infrared communication. [8+8]
5. Explain the impact of complexity of the logic on logic synthesis. [16]
6. (a) Explain about software development process in Embedded Systems.
   (b) What is an interrupt? Why they are required in a computer? Explain clearly how multiple are handled by the computer. [8+8]
7. With respect to embedded RTOS compare among the following :
   (a) Mailbox
   (b) Message queue
   (c) Event Register
   (d) Pipes. [4+4+4+4]
8. With suitable examples explain how do you:
   (a) Enable the interrupt
   (b) Disable the interrupt
   (c) Set the variable
   (d) Access the stored resource. [5+6+5]

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