

Code No: 07A7EC20

**R07****Set No. 2**

**IV B.Tech I Semester Examinations, MAY 2011  
EMBEDDED SYSTEMS**

**Common to Information Technology, Computer Science And Engineering**

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions  
All Questions carry equal marks**

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1. Write the pros and cons of restricting the use of RTOS functions and features in developing embedded software using RTOS with a suitable example application. [16]
2. Explain the following instructions:
  - (a) MOV, MOVX, MOVC
  - (b) PUSH, POP
  - (c) XCH, XCHD. [6+5+5]
3. Describe the features of serial port of the 8051 in detail. [16]
4. (a) Explain with suitable example, how to perform multiple-byte signed arithmetic operation using relevant mnemonics.  
 (b) Write an assembly language program to add the byte in external RAM location 02CDh to internal RAM location 19h and put the result in to external RAM locations 00C0h(LSB) and 00C1h(MSB). Place comments on each line of code. [8+8]
5. (a) What are Reentrant functions? Explain how to decide if a given piece of function code is reentrant.  
 (b) Verify whether the following function is reentrant with justification? If not, modify the code to make it reentrant using semaphores or any other mechanism  

```

Static int iValue;
int iFixValue(int iParm)
{ int iTemp; iTemp = ivalue; iTemp +=iParm * 17;
  If (iTemp 4922 )
  iTemp = iParm;
  iValue = iTemp;
  iParm = itemp+179;
  if (iParm < 2000)
  return 1;
  else
  return 0;
}

```

[8+8]
6. (a) Describe the SHARC processor with the help of its functional block diagram.  
 (b) Write short notes on SHARC Link ports. [8+8]

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7. (a) With a diagram, show the memory mapping of the 8051 microcontroller.  
(b) Find the baud rate for the serial port in mode0 for a 6MHz crystal.  
(c) Find the largest possible time delay for a timer in mode1 if a 12MHz crystal is used. [8+4+4]
8. (a) Name and describe the four development models which most embedded projects are based upon.  
(b) Explain in brief about five challenges commonly faced when designing an embedded system. [8+8]

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1. (a) What do you understand by interface and interfacing an I/O device? Give examples for standard interfaces with brief specifications.
- (b) List different types of keyboards with their specifications. Explain two ways how a key position is represented as TTL logic '1' and TTL logic '0' for open and close positions of the switch respectively. [8+8]
2. Verify whether the following function is a reentrant? Justify your answer. If not, modify it to make it reentrant.
 

```
static int iCount;
void vNotReentrant (int x, int *p)
{
int y;
y = x * 2;
++p;
*p = 123;
iCount +=234;
printf("\n new Count : %d", x);
}
```

[16]
3. (a) Discuss the hard real-time scheduling considerations in hard real-time systems
- (b) List and explain different approaches for saving power for embedded software design using RTOS. [8+8]
4. (a) Explain with suitable example, how to perform unsigned multiplication using relevant mnemonics.
- (b) Write an assembly language program to multiply the unsigned number in register R3 by the unsigned number on port 2 and put the result in external RAM locations 10h(MSB) and 11h(LSB). Place comments on each line of Code. [8+8]
5. Describe the various operating modes of the UART and associated control registers. [16]
6. Explain how memory organization of ARM processor is different from conventional general purpose processors memory organization. [16]
7. (a) Explain about embedded processor for a complex system.
- (b) Explain the importance of the following processors in embedded systems.

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- i. Digital signal processor
  - ii. ASSP. [8+8]
8. (a) Explain about rotate and swap operations by taking into consideration of register A.
- (b) Assume that register A has packed BCD. Write an assembly language program to convert packed BCD to two ASCII numbers and place them in R2 and R6. Also write comment on this. [8+8]

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**R07****Set No. 1**

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Max Marks: 80

Answer any FIVE Questions

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1. (a) Describe different types of data in an RTOS-based Real-Time System with their characteristics.  
(b) What do you understand by shared data problem? Explain with an example. [8+8]
2. (a) Explain how a media processor differ from a DSP processor.  
(b) What are the techniques of power and energy management in an embedded system. [8+8]
3. Give hardware and software for interfacing a keyboard of 4-Toggle switches to 8051-based system with a requirement of storing the status of 4-toggle switches for ten seconds in suitable data memory locations for every one second and stop whenever all switches are either in open or close condition [16]
4. List the data addressing modes of 8051 microcontroller and explain them with suitable examples. [16]
5. Explain the necessary details on interrupts while writing interrupt-driven programs. [16]
6. Describe the general operation of a typical telegraph system in which network port and serial ports communicate via tasks for printing serial data received using DDP and ADSP protocol stack. Assume suitable data with a functional block diagram. [16]
7. With reference to the ARM processors explain the following instructions: i)LSL ii)LSR iii)ASL iv)ASR v)ROR vi)RRX vii)MOV viii) MVN. [8×2=16]
8. (a) Explain about IE and IP function registers relevant to8051 microcontroller interrupts.  
(b) Discuss about external interrupts and software generated interrupts in 8051 microcontroller. [8+8]

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1. (a) What are the multiplication instructions available in 8051 Assembly language and explain with an example.  
(b) What are the Division instructions available in 8051 assembly language and explain with an example. [8+8]
2. Draw the block diagram of the 8051 microcontroller and describe in detail about its CPU components. [16]
3. Define the following relevant to an Embedded system:
  - (a) Physical device
  - (b) Virtual device
  - (c) Plug and Play device
  - (d) Bus self-powered device
  - (e) Device management
  - (f) Device specific processor. [16]
4. Implement a 2-digit Hexa-Decimal up- counter by interfacing two 7-segment LED displays with a delay of 500ms. Write the display codes and assume that they are available at data memory locations. [16]
5. Write two applications of SHARC processor-based systems with functional block diagram for each application and explain its working. [16]
6. Write the three merits and five demerits of using a large number of tasks in a typical design of embedded software. [16]
7. Assume that a message is to be printed line by line after formatting it. Develop C-pseudo code using  $\mu C$  /OS RTOS's function prototypes by using a semaphore as a signaling device. Assume one printer task function and one printer interrupt function. [16]
8. (a) Explain Rotate and Swap operations in 8051.  
(b) Write an 8051 ALP to move bit6 of  $R_0$  to bit3 of port3. [6+10]

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