

Code No: 07A70508

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

IV B.Tech I Semester Examinations, December 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. Discuss various serial data modes available to the programmer in transmitting and receiving data using the serial port of 8051. [16]
2. Briefly explain the following Addressing modes with reference to the 8051 Micro-controller:
  - (a) Immediate Addressing mode
  - (b) Register Addressing mode
  - (c) Direct Addressing mode
  - (d) Indirect Addressing mode. [4×4=16]
3. (a) Define the terms 'System and an 'Embedded system'.  
 (b) Explain the components of an embedded system hardware.  
 (c) Give the classification of Embedded systems. [4+8+4]
4. (a) What are the 16-bit data addressing registers of the 8051 microcontroller and explain their functions.  
 (b) Tabulate the special function registers by making four columns as register, bit, primary function and bit addressable. [8+8]
5. (a) What are Reentrant functions? Explain how to decide 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]

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6. Outline the use of script files and output files in debugging process of embedded software by giving sample script file and sample output file. Assume suitable data. [16]
7. (a) Compare and contrast ARM Bus and SHARC Bus.  
(b) Describe ARM two stage Address translation. [8+8]
8. (a) Explain with suitable example, how to perform bit jumps using relevant mnemonics.  
(b) Write an assembly language program for the data given below: The number A6h is placed somewhere in external RAM between locations 0100h and 0200h. Find the address of that location and put that address in R6(LSB) and R7(MSB). Place comments on each line of code. [8+8]

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1. (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]
2. Compare and contrast three methods of protecting shared data with suitable examples. [16]
3. Write short notes on the following with reference to 8051 microcontroller hardware:  
(a) 8051 oscillator and clock.  
(b) Program counter and Data pointer. [8+8]
4. Develop interface for a 4×4 Push-button matrix keyboard that is being attached to 8051-based system. Write the keyboard program to detect any key closure using interrupt driven operation and store the scanned key code in a data memory location. [16]
5. Write two applications of ARM processor-based systems with functional block diagram for each application and explain its working. [16]
6. (a) Explain how to perform testing programs using a personal computer.  
(b) Explain how to perform testing programs on a single-board computer.  
(c) What is importance of testing programs? [6+6+4]
7. Give suitable hardware and software at functional level for monitoring and controlling the RAIL-ROAD CROSSING SYSTEM with the assumption of suitable data. [16]
8. (a) Explain with suitable example, how to perform decimal arithmetic operation using relevant mnemonics.  
(b) Write an assembly language program to get hex data in the range of 00-FFh from the port 0 and convert it to decimal. Save the digits in R7, R6 and R5, where the LSB is in R7. Place comments on each line of code. [8+8]

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1. (a) How UML is used in Embedded System Design process? Briefly explain.  
(b) Describe the following:
  - i. An object in UML notation
  - ii. A class in UML notation. [8+8]
2. (a) What determines the address of the first instruction in memory?  
(b) Write an assembly language program for moving the data in addresses 0010H to 001AH to addresses 0020H to 002AH. [6+10]
3. Write the hardware and software for transmitting one character -'A' to a serial output device using 8051-based system under interrupt driven i / o mechanism. [16]
4. (a) Explain the concept of interrupts and returns with suitable example.  
(b) Assuming the crystal frequency is 10 MHz, write a program that will use timer 1 to interrupt the program after a delay of 2ms. [8+8]
5. Enumerate various timer function call services associated with  $\mu$ C/OS RTOS with their function prototypes and applications. [16]
6. (a) Explain the following, with respect to the 8051 microcontroller registers Organization.
  - i. PC and DPTR
  - ii. PSW.
 (b) Sketch and explain internal RAM organization of the 8051 microcontroller. [8+8]
7. (a) List out Fixed point ALU operations in SHARC processor and explain.  
(b) How many General purpose registers are there in the SHARC processor and explain. [8+8]
8. Give hardware and software at functional level for designing elevator controller using basic design principles using a RTOS. [16]

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1. (a) List out the 7 layers of OSI model and explain.  
(b) Explain
  - i. Crossbar Network
  - ii. Multistage Network. [8+8]
2. Discuss different network configurations suitable for serial data communications in respect of reliability, speed, fault finding, cost, etc. [16]
3. (a) Explain how to understand the assembly language syntax.  
(b) What are the flow chart elements and action box elements? Discuss about them. [8+8]
4. (a) Explain about TCON and TMOD function registers relevant to counters and timers of the 8051 microcontroller.  
(b) Draw and explain the timer/counter logic in which the resultant timer clock is gated to the timer circuit. [8+8]
5. (a) List the advanced microprocessors and microcontrollers used in the embedded systems.  
(b) What are the functional circuits in a chip or core of microcomputer in an embedded system? Explain them in brief. [8+8]
6. (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]
7. Write the C-pseudocode for Nuclear Reactor's problem of detecting equality of two temperatures using  $\mu C$  /OS RTOS's function prototypes by passing pointers on queues. [16]
8. Explain how a separate task helps to control shared hardware like flash memory in the design of embedded software with a suitable C-pseudocode using POSIX standard for RTOS interface such as mq-open, mq-send, mq-receive, and nanosleep. [16]

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