

Code No: 07A7EC20

R07**Set No. 2****IV B.Tech I Semester Examinations, November 2010****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**

1. (a) Describe digital computer system organization and operation.
(b) Explain the function of the CPU and memory. [8+8]
2. Explain the following Instructions:
(a) INC destination.
(b) DEC destination.
(c) ADD destination, source.
(d) ADDC destination, source.
(e) SUBB destination, source.
(f) MUL AB.
(g) DIV AB.
(h) DA A. [8×2=16]
3. Explain the following types of relationships exist between objects and classes.
(a) Association
(b) Aggregation
(c) Composition
(d) Generalization. [8+8]
4. Design hardware and software for implementing a basic calculator that performs basic arithmetic operations by interfacing a suitable calculator type Keyboard to 8051-based system. [16]
5. (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]
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]

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7. Design Underground Tank Monitoring Systems(UTMS) for four tanks to read temperatures and float levels, printing when required, and alarming under extreme conditions. Use a keyboard interface, display interface, printer interface, etc. and suitable processor. Assume suitable data wherever necessary. [16]
8. (a) Describe relevant function prototypes of μC /OS for initializing and using semaphores.
(b) Explain using μC /OS and C-pseudo code, how semaphores protect data in the Nuclear Reactor's problem of detecting equality of two temperatures.[8+8]

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R07**Set No. 4****IV B.Tech I Semester Examinations, November 2010****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**

1. Describe the following:
 - (a) Machine language
 - (b) Assembly language
 - (c) High level language. [6+5+5]
2. Describe the various architectural features of one of the SHARC processors of your choice with its functional block diagram. [16]
3. Discuss the objections, limitations, and shortcomings that are raised by engineers to testing embedded system code on their host systems. [16]
4. Generate a sawtooth wave with amplitude of +4V and frequency of 250Hz using 8-bit DAC interface to 8255 PPI that is interfaced to 8051 system. Assume 8255 address as 8800H to 8803H. [16]
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 increment and decrement the contents of registers and RAM using relevant mnemonics.
- (b) Write an assembly language program to increment the contents of RAM locations 13h, 14h and 15h using indirect addressing. Place comments on each line of code. [8+8]
7. (a) Why a low-address byte latch for external memory is needed.
- (b) How an I/O pin can be both an input and output.
- (c) Evaluate the execution time of a single cycle instruction for a 6MHz crystal. [6+6+4]
8. Assume that a message is to be printed line by line after formatting it. Develop C-pseudo code using μC /OS RTOS's function prototypes by using a semaphore as a signaling device. Assume one printer task function and one printer interrupt function. [16]

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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. 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]
3. Draw the block diagram of the 8051 microcontroller and describe in detail about its CPU components. [16]
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 a 10 base-T Ethernet at the following OSI complaint levels of detail.
 - (a) Physical
 - (b) Data link
 - (c) Network
 - (d) Transport. [4+4+4+4]
6. Outline three different plans by which RTOS finds out that an interrupt routine is executing. Compare these three plans. [16]
7. (a) Write short notes on bit-addressable control registers.
(b) Write an assembly language program to find a number that when XORed to the A register results in the number 3Fh in A. Also write comment on this. [8+8]
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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1. (a) Explain which bits in which registers must be set to give the serial data interrupt to the highest priority.
(b) When used in multiprocessing, explain which bit in which register is used by a transmitting 8051 to signal receiving 8051s that an interrupt should be generated. [8+8]
2. (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]
3. Compare and contrast three methods of protecting shared data with suitable examples. [16]
4. (a) Explain the commands that place data in registers, internal memory and external memory.
(b) Write an assembly language program to copy a block of 8 bytes of data to RAM locations starting at 50H from RAM locations 30H. Also write comment on this. [8+8]
5. Compare the features in an exemplary family chip or core of each of the following.
(a) Microprocessor
(b) Microcontroller
(c) RISC processor
(d) Digital Signal Processor. [16]
6. Explain the necessary details on interrupts while writing interrupt-driven programs. [16]
7. Implement 8051 interface (hardware and software) for 8-toggle switches to perform four basic logic operations on two 3-bit binary operands. Assume that 6-bits correspond to 6 toggle switches for operands and 2-bits correspond to 2 toggle switches for logic operations. The operand data and result of operation be stored in data memory locations. [16]
8. (a) What are the data types the SHARC support explain
(b) Write SHARC assembly code to first read and then write a device memory mapped to location 0x400110. [6+10]
