

III B.Tech I Semester Regular Examinations, November 2006

EMBEDDED SYSTEMS DESIGN
(Electronics & Computer Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Explain the general features of microprocessors and microcontrollers by giving one example for each. Discuss why micro controllers are preferred for embedded systems. [16]
2. Explain the terms: 'power supply decoupling', 'open-collector output', 'Tristate output', 'fan-out' for TTL logic gates. [4+4+4+4]
3. Explain the following terms in the context of an embedded application.
 - (a) Interrupt priority
 - (b) Interrupt masking
 - (c) Context switching
 - (d) Priority inversion [4+4+4+4]
4. Give justifications for using a multitasking RTOS for embedded systems. Explain the different states of a task in the system with the help of a state transition diagram. [8+8]
5. What is an 'heart beat timer'? Explain why is it required in RTOS. [8+8]
6. Discuss the special issues involved in specification, design and testing stages of an embedded system development. [16]
7. Explain the differences between an 'Host Computer System' and a 'Target System' in terms of their hardware and software. [8+8]
8. Explain the important features of the following operating systems that are relevant to embedded applications.
 - (a) RT Linux
 - (b) Windows XP
 - (c) Win CE
 - (d) V_x works [4+4+4+4]

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1. Discuss various steps involved in the development of an embedded system with an example. [16]
2. Write Truth Table for the following types of gates and give one example for each type of gate where it can be used.
 - (a) 3-Input NAND gate
 - (b) 2-Input XOR gate
 - (c) 2-Input NOR gate
 - (d) NOT gate [4+4+4+4]
3. Explain the following
 - (a) Nested interrupts
 - (b) Polling
 - (c) Context switching
 - (d) Interrupt masking [4+4+4+4]
4. Discuss the important features of various software architectures adopted for embedded systems. [16]
5. What are the rules to be followed by the interrupt routines in RTOS? Why? [8+8]
6. Write short notes on the following
 - (a) Hard real-time systems
 - (b) Soft real-time systems
 - (c) Time-slicing
 - (d) Encapsulation [4+4+4+4]
7. Explain the differences between an 'Host Computer System' and a 'Target System' in terms of their hardware and software. [8+8]
8. Explain the functional blocks and the specification of the software of a GPS system. [16]

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1. What are embedded systems? Define hard-real time and soft-real time embedded systems. Give any two examples for each of these two categories and justify why they are hard/soft real time embedded systems. [2+6+4+4]
2. Explain the terms: 'power supply decoupling', 'open-collector output', 'Tristate output', 'fan-out' for TTL logic gates. [4+4+4+4]
3. Explain the sequence of operations that take place in the CPU starting from when it receives an external interrupt till it completes the interrupt sub-routine. [16]
4. Explain the functions of a scheduler in an RTOS and how does the scheduler carryout those functions. [8+8]
5. Why do we need timer functions in RTOS? Briefly discuss how they are provided. [8+8]
6. Write short notes on the following
 - (a) Hard real-time systems
 - (b) Soft real-time systems
 - (c) Time-slicing
 - (d) Encapsulation [4+4+4+4]
7. Explain the following software development tools
 - (a) A Cross-Compiler
 - (b) A Cross-Assembler
 - (c) A Linker
 - (d) A loader/locator [4+4+4+4]
8. Why serial communication facility is required in embedded systems? What are the communication parameters and explain the steps involved in typical serial data transmit and receive programs with the help of flow charts. [8+8]

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1. Explain the role of operating systems and the programming languages for the development of embedded systems. [16]
2. Explain the terms: 'power supply decoupling', 'open-collector output', 'Tristate output', 'fan-out' for TTL logic gates. [4+4+4+4]
3. Explain the following terms in the context of an embedded application.
 - (a) Interrupt priority
 - (b) Interrupt masking
 - (c) Context switching
 - (d) Priority inversion [4+4+4+4]
4. Write short notes on the following in the context of an RTOS
 - (a) Priority inversion
 - (b) Deadly embrace
 - (c) Mutex
 - (d) Counting Semaphore [4+4+4+4]
5. What are events? Explain the role of events in RTOS. [8+8]
6. Discuss the special issues involved in specification, design and testing stages of an embedded system development. [16]
7. Explain the differences between an 'Host Computer System' and a 'Target System' in terms of their hardware and software. [8+8]
8. Explain the important features of the following operating systems that are relevant to embedded applications.
 - (a) RT Linux
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