

**IV B.Tech II Semester Regular Examinations, Apr/May 2006**

**EMBEDDED SYSTEMS**

**(Computer Science & Engineering)**

**Time: 3 hours**

**Max Marks: 80**

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

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1. Divide the Embedded systems into different categories. Give two examples for each category of embedded systems and explain their important features. [4+6+6]
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 term 'Interrupt Latency'. Discuss various measures to reduce the interrupt latency in embedded applications. [8+8]
4. Discuss the relative merits and demerits of various shared-data protection mechanisms. [16]
5. Compare various methods of intertask communication. [8+8]
6. Explain the methods used to save memory space required for data and code in embedded systems. [16]
7. Why in general an Host machine is used for the developments of an embedded system software. Explain various software development tools provided by a Host system. [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<sub>x</sub> works [4+4+4+4]

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1. Draw the functional blocks of the following embedded systems and briefly explain them.
  - (a) A digital camera
  - (b) A process control system
  - (c) A Multimeter
  - (d) A Handheld computer [4+4+4+4]
2. What is DMA operation in a Computer? Why is it required in a computer? Clearly explain how it is implemented? [5+5+6]
3. What is shared-data problem in an embedded system? Explain with an example. [8+8]
4. Discuss the important features of various software architectures adopted for embedded systems. [16]
5. Explain the features of the following methods of inter-task communication
  - (a) Semaphores
  - (b) Queues
  - (c) Mail boxes
  - (d) Pipes [4+4+4+4]
6. Explain the need for encapsulating semaphores and queues with an example. [16]
7. What are the main goals of software development for embedded systems? Explain how an Host system meets these goals. [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<sub>x</sub> works [4+4+4+4]

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1. Explain the important features of any two examples of embedded systems belonging to each of the following areas of applications.
  - (a) Consumer electronics
  - (b) Tele communications
  - (c) Data communications
  - (d) Wireless communication [4+4+4+4]
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 terms “Atomic” and “critical Section” in the context of a code for embedded systems. Explain with an example, one solution to solve the shared-data problem. [16]
4. Explain the characteristics of a ‘reentrant’ function. Where and why do we need ‘reentrant’ functions? [8+8]
5. Explain the features of the following methods of inter-task communication
  - (a) Semaphores
  - (b) Queues
  - (c) Mail boxes
  - (d) Pipes [4+4+4+4]
6. Explain the methods used to save memory space required for data and code in embedded systems. [16]
7. Explain the different phases of software development cycle for embedded systems. [16]
8. Explain the important features of the following programming languages for embedded system development.

- (a) Assembly language
- (b) C-language
- (c) C++
- (d) Java

[4+4+4+4]

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1. What are the various hardware functional blocks required to build a typical embedded system? Briefly explain their features and use. [16]
2. Explain the features of a DSP processor. Describe the use of a DSP processor in a speech recognition system. Why do you think the use of a DSP processor is better than using a microprocessor / microcontroller for such applications. [5+5+6]
3. What is an interrupt? Why they are required in a computer? Explain clearly how multiple are handled by the computer? [3+3+10]
4. Discuss the relative merits and demerits of various shared-data protection mechanisms. [16]
5. What are events? Explain the role of events in RTOS. [8+8]
6. Explain the methods used to save memory space required for data and code in embedded systems. [16]
7. Why in general an Host machine is used for the developments of an embedded system software. Explain various software development tools provided by a Host system. [8+8]
8. Describe the requirements of the following embedded applications with an example for each
  - (a) A protocol converter system
  - (b) An IP phone [8+8]

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