

**IV B.Tech II Semester Regular Examinations, Apr/May 2008**  
**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. 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. What kind of memory is preferred to store each of the following and why?
  - (a) The program of an intelligent VCR which are required in millions of units.
  - (b) The user-configurable name for a printer attached to a network that the printer should remember even if the power fails.
  - (c) The program for a beta version of an x-ray machine that your company is about to ship to general hospitals on experimental basis.
  - (d) The data that is just received from the network. [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. What are events? Explain the role of events in RTOS. [8+8]
  
6. Explain the need for encapsulating semaphores and queues with an example. [16]
  
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. 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. Write short note on the following parts of embedded systems.
  - (a) Processors
  - (b) Memory
  - (c) Operating System
  - (d) Programming Languages [4+4+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. What are the important features of Assembly Language? Explain the reasons why Assembly Language programming is preferred for some types of embedded systems. [8+8]
4. Explain the functions of a scheduler in an RTOS and how does the scheduler carryout those functions. [8+8]
5. Compare various methods of intertask communication. [8+8]
6. Explain the terms 'structure', 'modularity', 'encapsulation', and 'maintainability' in the context of embedded software. [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. Explain the functional blocks and the specification of the software of a GPS system. [16]

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1. Write short note on the following hardware units used to build embedded systems.
  - (a) Microprocessors
  - (b) Microcontrollers
  - (c) DSP processors [5+5+6]
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. What are events? Explain the role of events in RTOS. [8+8]
6. Explain the terms 'structure', 'modularity', 'encapsulation', and 'maintainability' in the context of embedded software. [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 requirements (specifications) of any four Networked Java-Enabled information appliances. [16]

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1. Write short note on the following.
  - (a) Serial data transfer standards
  - (b) Laboratory instruments for testing the embedded systems. [8+8]
2. Explain the terms: 'power supply decoupling', 'open-collector output', 'Tristate output', 'fan-out' for TTL logic gates. [4+4+4+4]
3. What is shared-data problem in an embedded system? Explain with an example. [8+8]
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. Why do we need timer functions in RTOS? Briefly discuss how they are provided. [8+8]
6. Explain the need for encapsulating semaphores and queues with an example. [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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