

Code :R7420402

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IV B.Tech II Semester(R07) Regular Examinations, April 2011

EMBEDDED & REAL TIME SYSTEMS

(Common to Electronics & Communication Engineering and Electronic & Instrumentation Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions
All questions carry equal marks

1. (a) Compare the three processor technologies with respect to their features, user benefits and drawbacks.
(b) Explain the various methods of optimizing custom single purpose processors with examples.
2. (a) Explain briefly how to test and debug an embedded system.
(b) Write short notes on application-specific instruction set processors.
3. Explain the difference between state machine and sequential program model. Draw the sequential program model and finite state machine (FSM) model of the elevator controller.
4. (a) Explain the features of USB.
(b) Write short notes on infrared communication.
5. With suitable examples explain how do you:
(a) Enable the interrupt.
(b) Set the variable.
(c) Access the stored resources.
6. Explain the use of messages queues, mailboxes, and pipes.
7. Write short notes on the following.
(a) Memory management.
(b) Timers.
8. (a) Describe the new challenges created by 'cores' for processor developers as well as users.
(b) Show the correspondence of these types of cores with Gajski's Y-Chart.

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1. (a) Compare the three IC technologies with respect to their features, user benefits, and drawbacks.
(b) Explain RT-level custom single purpose processor design.
2. Write short notes on the following topics.
 - (a) Cache memory.
 - (b) Pipelining.
 - (c) Addressing modes
 - (d) Register and Base Address.
3. (a) What is ISR? Briefly explain.
(b) Explain about various external interrupts in any microprocessor.
(c) Explain about Less-General ASIP environments.
4. (a) What are the advantages of USB over RS232?
(b) Give broad specifications of Bluetooth standard.
5. (a) Write short notes on tasks and task states in RTOS.
(b) What are the basic services provided by scheduler in RTOS? Describe any two scheduling algorithms.
6. With suitable examples explain how to:
 - (a) Query a mailbox.
 - (b) Post a message in a mailbox.
 - (c) Read message from a mailbox.
7. Explain the important features of the following operating systems
 - (a) RT Linux.
 - (b) Windows CE.
8. (a) Define hardware/software co-simulator.
(b) What is a key method for speeding up such simulator?

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1. (a) Explain about RT-level sequential components.
(b) Draw the FSMD for computation of GCD. The data inputs are x_i and y_i and data output is d_o representing the GCD. The process of computation begins when the control input go_i is true. Briefly explain the steps for creating the data path part of the GCD example with the help of a diagram.
2. (a) Explain about superscalar and VLIW architectures.
(b) Explain how instructions are decoded and executed by the microprocessors.
3. (a) Explain difference between moore-type FSM and mealy -type FSM.
(b) Explain about FSMD.
(c) Give the difference between computation model and languages.
4. (a) Explain the protocol architecture of Ethernet LAN.
(b) Explain RS232 connector configurations. Explain all signals for implementing synchronous as well as asynchronous serial data communications.
5. (a) Explain the importance of semaphores in RTOS.
(b) Explain the difference between semaphores and mutex with suitable examples.
6. (a) Explain how pipes are useful for inter-task communication.
(b) Explain the following with examples.
 - i. How to create a pipe.
 - ii. How to open a pipe.
7. (a) Explain the important features of any two handheld operating systems.
(b) What is priority inversion problem? How is this solved by priority inheritance?
8. (a) List and describe three general approaches to improving designer productivity.
(b) Describe each tool that has enabled the elevation of software design and hardware design to higher abstraction levels.

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1. (a) What is an embedded computer system? Explain the characteristics of embedded systems.
(b) What is a design metric and lists six of them. Define time-to-market and time-to-prototype design metric.
2. Explain the software development process (implementation and verification phase) in an embedded system with the help of a neat block diagram.
3. (a) Define the following terms: finite-state machines, concurrent processes, real-time systems and real-time operating systems.
(b) Explain about synchronization among processes.
4. (a) Explain briefly about communication between nodes in wireless LAN.
(b) Explain about the CSMA/CA protocol.
5. (a) Explain the difference between pre-emptive and non-pre-emptive operating systems.
(b) What are the objects of operating systems Kernel?
6. Write short notes on the following methods of inter task communication:
(a) Mailbox, (b) Message queues, (c) Pipes
7. (a) Explain the steps in developing applications using real time operating system.
(b) Explain the important features of any two embedded operating systems.
8. With examples explain the two-level and multi-level logic minimization with respect to combinational logic synthesis.
