

IV B.Tech. I Semester Regular Examinations, November -2005
REAL TIME SYSTEMS
(Common to Information Technology, Computer Science & Systems
Engineering and Electronics & Computer Engineering)
Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. List out the characteristics of
 - (a) batch processes
 - (b) continuous processes
 - (c) Distributed Systems. [4+4+8]
2.
 - (a) Explain simple digital signal output interface and discuss with example.
 - (b) Explain simple Digital Signal input interface and explain with an example. [8+8]
3. Explain in detail, the following concepts
 - (a) Blocks
 - (b) Procedures and Functions
 - (c) Packages [4+5+7]
4.
 - (a) What are the basic functions of task management module ?
 - (b) Draw a task state diagram.
 - (c) How does scheduler and real time clock interrupt handler work? Explain with the help of a diagram [4+4+8]
5. Discuss whether or not the following are hard, soft real time systems. Justify your answer.
 - a. A police database the provides information on stolen automobiles.
 - b. An automatic teller machine.
 - c. A universitys grade processing system, which takes grade sheets and generates report cards.
 - d. A computer controlled routing switch used by a phone company.
 - e. An Aircraft controller
 - f. Railway reservation system
 - g. An oven heat controller system
 - h. A Toy controller.[8x2-16]
6. (a) Explain ACID properties of Database Transactions.

- (b) Describe how Petri nets are used to model and analyse mutual exclusion. [8+8]
- 7. (a) Explain how to handle Integrated failures.
- (b) What factors govern the optimal placement of checkpoints? Assume that the purpose is to minimize the probability of missing task deadlines. [6+10]
- 8. (a) What are the ways to obtain device failure rates? Explain.
- (b) Give brief description about hardware and software reliability models. [6+10]

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1. Discuss about sequence control with the help of an example of a Simple Reactor vessel. [16]
2. Discuss process-related interfaces for a Real Time Systems. [16]
3. (a) Ada is a better language for real-time software than any general purpose language. Justify.
(b) Differentiate between Ada and modula-2 basic philosophy. [8+8]
4. (a) What are the basic functions of task management module ?
(b) Draw a task state diagram.
(c) How does scheduler and real time clock interrupt handler work? Explain with the help of a diagram [4+4+8]
5. Discuss whether or not the following are hard, soft real time systems. Justify your answer.
 - a. A police database the provides information on stolen automobiles.
 - b. An automatic teller machine.
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 - e. An Aircraft controller
 - f. Railway reservation system
 - g. An oven heat controller system
 - h. A Toy controller.[8x2-16]
6. (a) Why and how does multitasking approach deployed for the design of Real Time Systems?
(b) How do you handle the transaction priorities in real time databases? [10+6]
7. (a) Explain the organization of a disk system.
(b) Why is EDF not always optimal for disk access scheduling? Explain. [8+8]
8. (a) What are the ways to obtain device failure rates? Explain.
(b) Give brief description about hardware and software reliability models. [6+10]

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1. Explain the following :
 - (a) Loop Control
 - (b) Supervisory Control
 - (c) Direct Digital Control. [5+5+4]
2. Discuss process-related interfaces for a Real Time Systems. [16]
3. Explain in detail, the following concepts
 - (a) Blocks
 - (b) Procedures and Functions
 - (c) Packages [4+5+7]
4.
 - (a) Explain the various priority types in RTOS.
 - (b) What is the difference between static and dynamic priorities ? Under what circumstances, the use of dynamic priorities is justified ? [7+9]
5.
 - (a) Describe multitasking approach for real time systems.
 - (b) Explain monitors for real time systems. [8+8]
6.
 - (a) Explain ACID properties of Database Transactions.
 - (b) Describe how Petri nets are used to model and analyse mutual exclusion. [8+8]
7. Define and explain the following:
 - (a) Hardware redundancy
 - (b) Software redundancy
 - (c) Time redundancy
 - (d) Information redundancy [4+4+4+4]
8.
 - (a) What are the ways to obtain device failure rates? Explain.
 - (b) Give brief description about hardware and software reliability models. [6+10]

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1. Explain the following in detail :
 - (a) Clock-based tasks
 - (b) Event-based tasks
 - (c) Interactive Systems. [5+5+6]
2. Discuss process-related interfaces for a Real Time Systems. [16]
3. (a) Explain the following concepts in Real Time languages.
 - i. concurrency
 - ii. Security
 - iii. Efficiency(b) Explain the various approaches to compile the modules to obtain executable object code ? [9+7]
4. (a) Construct a set of periodic tasks (with release times, execution times and periods), which can be scheduled by the EDF algorithm but not by the RM algorithm to meet the dead lines.
(b) Describe the situations in which a task should not be pre-empted. [10+6]
5. Discuss whether or not the following are hard, soft real time systems. Justify your answer.
 - a. A police database that provides information on stolen automobiles.
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6. (a) Why and how does multitasking approach deployed for the design of Real Time Systems?

- (b) How do you handle the transaction priorities in real time databases? [10+6]
7. (a) Explain how to use hardware redundancy in the issue of voting and consensus.
(b) Explain in detail N-modular redundancy (NMR) for forward error recovery.
[8+8]
8. (a) What are the ways to obtain device failure rates? Explain.
(b) Give brief description about hardware and software reliability models. [6+10]
