

IV B.Tech. II Semester Supplementary Examinations, July -2005
REAL TIME SYSTEMS
(Information Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Explain the following :
 - (a) Loop Control
 - (b) Supervisory Control
 - (c) Direct Digital Control.
2. Explain in detail the following processors :
 - (a) Parallel Computers
 - (b) Digital Signal Processors
 - (c) Transputers
 - (d) Microcontrollers.
3. Explain what a binary semaphore does and write a program in modula-2 to demonstrate its use.
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 emptied.
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.
6. (a) A machine processes one job at a time. As soon as the processing of job is over, another job is made available and the machine starts processing again. Draw the petri net configuration for the above system, and explain it with its firing table?

- (b) Explain the following with reference to petri nets.
 - i. Places
 - ii. Transitions
 - iii. Markings
- 7. (a) Explain the following in detail.
 - i. fault latency
 - ii. Error recovery(b) Discuss various causes of failures in detail.
- 8. (a) What is exponentially - Distributed Fault Latency? Give a sequence of events resulting in triad failure.
 - (b) Give an introduction of transient faults.

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1. Discuss about sequence control with the help of an example of a Simple Reactor vessel.
2. Discuss process-related interfaces for a Real Time Systems.
3. Explain in detail, the following concepts
 - (a) Blocks
 - (b) Procedures and Functions
 - (c) Packages
4.
 - (a) Show that the periodic tasks (10,2), (15,5), and (25,9) are schedulable by the rate monotonic algorithm.
 - (b) Show that the periodic tasks (10,2) (12,5) and (15,4) are not schedulable by the rate monotonic algorithm.
 - (c) Construct the initial segments in the time interval (0,75) of a rate monotonic schedule and a earliest-deadline-first schedule of the periodic tasks (10,2) (15,5) and (25,12).
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.
6.
 - (a) Explain PAISLEY system.
 - (b) Define petri net and Give suitable examples.
7.
 - (a) Distinguish between Serialization consistency without the alteration of serialization order and with the alteration of serialization order.
 - (b) Discuss various concurrency control issues in real time databases.

8. (a) Describe Reliability Models for Hardware Redundancy.
- (b) Distinguish between combinatorial Model and Markov chain model.

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1. Explain the following :
 - (a) Batch Systems
 - (b) Continuous Systems
 - (c) Laboratory Systems
 - (d) Embedded Systems.
2.
 - (a) Give an introduction of hardware requirements for real time applications.
 - (b) Draw the schematic diagram of a general-purpose digital Computer and explain.
3. Explain in detail, the following concepts
 - (a) Blocks
 - (b) Procedures and Functions
 - (c) Packages
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 emptied.
5. Explain on RTS development using
 - (a) Hatley and Phribhai
 - (b) Ward and Mellor method
 - (c) MASCOT
 - (d) PAISLEY
6.
 - (a) Describe Hatley and Pribhai methodology for real time systems.
 - (b) Explain MASCOT system.
7. Define and explain the following:
 - (a) Hardware redundancy
 - (b) Software redundancy
 - (c) Time redundancy

- (d) Information redundancy
- 8. (a) Explain the combinatorial model for NMR clusters.
- (b) Solve the Markov chain for a system with transient and permanent failures using uniformization.

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1. Discuss about sequence control with the help of an example of a Simple Reactor vessel.
2. Explain the parts of a Real- Time systems:
 - (a) Central Processing Unit
 - (b) Storage
 - (c) Input and Output.
3.
 - (a) The standard input routines in Modula-2 cannot be used within a timed loop to obtain information from the key board. Why cant we use standard Modula-2 routines ? Explain.
 - (b) Explain the three models on which the implementation of real time software can be based .
4.
 - (a) List and explain the minimum set of operations that a RTOS kernel should support.
 - (b) With the help of diagram, explain the (input/output sub system)IOSS operations for Input of data.
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.
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6.
 - (a) Describe the analysis of petri nets.
 - (b) Explain transaction properties and aborts for real time databases.
7. Suppose a transaction T has a timestamp of 100. Its read set is x_1, x_2 and its write set is x_3, x_4, x_5 The read timestamps of these variables (prior to adjustment for the

commitment of T) are 5, 10, 15, 16, 18; and the write timestamps are 90, 500, 600, 300, 5 respectively. Write out the read and write timestamps following the commitment of T.

8. (a) What is meant by fault injection? Explain how it is used to measure an error Propagation time.
- (b) Explain real life components, which have a hazard rate shaped according to the Bathtub curve.
