

CE7-R3: REAL TIME SYSTEMS

NOTE:

1. Answer question 1 and any FOUR questions from 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.

- a) What is the need for response time predictability?
- b) How is warmhole routing used for pipelining packet transmission in a multihop network?
- c) What do you understand by clock synchronization?
- d) How does fault-tolerance system manage redundancy? Explain briefly different types of redundancy.
- e) Why is the precedence graph required? Explain it with the help of an example.
- f) What are the various forms of error recovery? How does a system attempt to recover from the effect of an error?
- g) Explain why Centrally Controlled Clock System are often called Master Slave System?

(7x4)

2.

- a) State Bin Packing Problem.
- b) Show that Bin packing problem is a variation of the scheduling problem.
- c) Name two simple heuristics for bin packing. If bins are of capacity 10 and 6 items have to be placed in bins, illustrate the solution with any heuristic.

(6+6+6)

3.

- a) Briefly explain how hardware faults e.g. processor failures can be tolerated in a Real-Time Applications.
- b) Explain how fault-tolerance can be achieved in real-time task communication?
- c) Explain a scheme to provide software fault-tolerance in a time safety critical application. Make suitable assumption.

(6+6+6)

4.

- a) What is real-time database?
- b) Briefly explain the following:
 - i) Main Memory Database
 - ii) Transaction Aborts
 - iii) Concurrency Control issues

(6+12)

5.

- a) What is Time-token protocol? Explain it in detail with a flowchart.
- b) Write a short-on Application Specific Processor.
- c) What are the major issues involved in dynamic scheduling? Explain them.

(6+6+6)

6.

- a) State the reason for Real-Time databases to compromise some of the ACID properties of conventional databases?
- b) Discuss the concurrency control issues for databases.
- c) Why is debugging real time software difficult? Explain how real time software can be efficiently debugged.

(6+6+6)

7.

- a) What problems would you experience if you use a contention based protocol such as Ethernet for real time task communications? Describe a contention based real time communication protocol and explain how it overcomes the problem that Ethernet suffers from.
- b) How does network topology for distributed system affect the system response time and reliability? What are the important features in this regard?

(6+12)