

Bachelor Level/ Third Year/ Six Semester/ Science
Computer Science and Information Technology (CSc. 354)
(Real Time System)

Full Marks: 80
Pass Marks: 32
Time: 3 hours

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Group A

Attempt any Two questions. (2x12=24)

1. Explain the various components of a real time system with suitable block diagram. State and prove the optimal Earliest-Deadline-First (EDF) algorithm.
2. Explain the multiprocessor priority ceiling protocol with suitable example.
3. Explain the Stack Stealing in deadline-driven system with suitable example.

Group B

Attempt any Eight questions. (8x7=56)

4. Explain the real-time command and control system with suitable example.
5. What is hard real time system? Explain with example.
6. Differentiate between data dependency and temporal dependency.
7. State and prove the Optimal Least-Stack-time-first (LST) algorithm.
8. Define the clock-driven scheduling. What are the advantages and disadvantages of it?
9. Differentiate between fixed-priority algorithm and dynamic-priority algorithm.
10. Explain the sporadic server in fixed-priority systems with example.
11. What is rate monotonic algorithm? Explain with suitable example.
12. Explain the priority based service disciplines for switched networks.
13. Write short note on:
 - a. Scheduling hierarchy
 - b. Communication in multicomputer system.

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Group A

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1. Explain the hard real time system and soft real time systems with example.
2. Differentiate between rate-monotonic and deadline monotonic algorithms with example.
3. Explain the Greedy Weighted Round Robin (WWR) disciplines and time. Driven Weighted Round Robin (WWR) disciplines with example.

Group B

Attempt any Eight questions.

(8x7=56)

4. Explain the Kalman filter with example.
5. Explain the digital controller with example.
6. Explain the diagram of radar signal processing and tracking system.
7. Differentiate between clock-driven scheduling and priority-driven scheduling.
8. Explain the schedulability of sporadic jobs in deadline –driven systems.
9. Explain with diagram of real time communication model.
10. What is constant utilization server algorithm? Explain.
11. What is RTCP control protocol? Explain with example.
12. Write down the total bandwidth server algorithm and explain it.
13. Write short note on:
 - a. Real time protocol
 - b. IEEE 802 token ring

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1. What is a real time system? Explain its various components with a suitable block diagram. Explain the RADAR signals processing with block diagram.
2. What do you understand by static slack computation in fixed – priority systems? Explain with example.
3. What are the three commonly used approaches to scheduling the real time systems? Compare each of them.

Group B

Attempt any Eight questions. (8x7=56)

4. What is digital control? Explain with example.
5. What is soft real time systems? Explain with example.
6. Differentiate between dynamic system and static systems with example.
7. Explain the sporadic server in fixed priority system.
8. Explain the slack computation in fixed priority system with example.
9. What are the procedure of a simple acceptance test in deadline-driven systems? Explain.
10. What are the properties of the priority-inheritance protocol? Explain.
11. Explain the weighted round robin service disciplines with example.
12. Explain the real time communication model with diagram.
13. Write short note on:
 - a. Fixed Priority Scheduling in CAN
 - b. Greedy WRR discipline

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1. Describe how is the polling, priority scheduling and schedulability analysis performed for prioritized access in IEEE 802.5 Token Rings. What are the other factors those should be taken into account?
2. Define priority driven algorithms. State and prove the optimal earliest deadline first (EDF) theorem.
3. What do you understand by slack stealing in a deadline driven system? Explain the operation of a slack stealer with example.

Group B

Attempt any Eight questions.

(8x7=56)

4. Define schedule and scheduler. List out the conditions under which a schedule becomes a “valid schedule”.
5. What do you understand by timing constraints and tardiness? Why does a hard real time system require timing guarantees?
6. Differentiate between offline and online scheduling in a real time system.
7. List out the advantages and disadvantages of a clock driven approach to scheduling.
8. Explain the meaning of “priority-inversion” with the help of timing diagram.
9. Differentiate between priority inheritance and priority ceiling protocols.
10. Describe a simple bin packing formulation method of task assignment in a multiprocessor system.
11. How is the connection established in a Greedy WRR scheduling algorithms? Explain.
12. Describe a real time communication architecture of distributed system with diagram.

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Group A

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1. Describe the rules for basic priority inheritance protocol with example.
2. Define resource reservation protocol. Explain in brief, the different types of issues that a resource reservation protocol must deal with.
3. Define rate-monotonic (RM) and deadline-monotonic (DM) algorithms. Describe the DM algorithm with example.

Group B

Attempt any Eight questions.

(8x7=56)

4. What do you understand by “Tracking” and “Gating” in a Radar system? Explain.
5. What are the meanings of hard real time system, hard timing constraints and temporal quality of service guarantees?
6. Define release time jitter, relative deadline, and hyper period. If the execution times of three periodic tasks are 1, 1, and 3, and their periods are 3, 4, and 10, then find out the total number of jobs in the hyper-period, and total utilization of jobs.
7. Describe the significance of laxity type with the help of suitable diagram.
8. Differentiate between dynamic systems and static system in real time systems.
9. Why does the scheduler perform an acceptance test while scheduling sporadic jobs? Explain.
10. Define Deferrable server. State and explain the consumption and replenishment rules of deferrable servers.
11. Describe the meaning of resource conflict, blocking, priority inversion, and deadlock caused by resource contention.
12. Describe the meaning of job shops and flow shops of end to end tasks in a multiprocessor scheduling.
13. Write short notes on: **(Any Two)**
 - a. Service discipline in real time communication
 - b. Critical section and outermost critical section
 - c. Context switches

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1. What do you understand by basic priority ceiling protocol? Explain it with the help of suitable example.
2. Differentiate between fixed priority and dynamic priority algorithms. State and prove the optimality of Least Slack Time (LST) First algorithm.
3. Define deferrable server. Describe the operation of deferrable servers in detail with example.

Group B

Attempt any Eight questions. (8x7=56)

4. Differentiate between dynamic and static real time systems.
5. Draw and describe a model of real time system.
6. What are the advantages and disadvantages of clock driven scheduling approach?
7. Define temporal parameter of real time workload? Explain different types of temporal parameters of a job.
8. What are the requirements for Real-Time Multimedia Traffic? Explain.
9. What do you understand by 'Busy Intervals' in fixed priority tasks with arbitrary response times? Explain.
10. What are the different types of issues that a resource reservation protocol must deal with in a multicast environment? Explain.
11. What do you understand by Task Assignment, Job Shops and Flow Shops? Explain.
12. Describe a real-time communication model with the help of suitable diagram.
13. Write short notes on:
 - a. Embedded System
 - b. Real Time Control Protocol (RTCP)