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BTECH
(SEM VI) THEORY EXAMINATION 2023-24
REAL TIME SYSTEMS

TIME: 3 HRS**M.MARKS: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A**1. Attempt all questions in brief.**

a.	Differentiate between hard real-time systems and soft real-time systems.	02
b.	Define a real-time system.	02
c.	What is the difference between dynamic and static systems in real-time scheduling?	02
d.	How are aperiodic and sporadic jobs scheduled in priority-driven systems?	02
e.	Explain resource access control (RAC) in real-time systems.	02
f.	What techniques are used to control concurrent access to data objects?	02
g.	Differentiate between soft and hard real-time communication systems.	02
h.	What is the function of Medium Access Control (MAC) protocols in broadcast networks?	02
i.	What are POSIX issues related to real-time systems?	02
j.	Provide an overview of commercial real-time databases.	02

SECTION B**2. Attempt any three of the following:**

a.	Evaluate the importance of release times, deadlines, and timing constraints in the design of real-time systems. How do these factors affect the scheduling of tasks?	10
b.	Discuss the weighted round robin approach to real-time scheduling. Explain how it works and analyze its advantages and disadvantages compared to other real-time scheduling methods.	10
c.	Discuss the effects of resource contention in real-time systems. Explain how resource contention can impact system performance and task scheduling.	10
d.	Examine the challenges and solutions associated with real-time communication over the Internet. Discuss the role of resource reservation protocols (such as RSVP) in managing network resources and ensuring quality of service (QoS) for real-time applications.	10
e.	Evaluate the use of UNIX as a real-time operating system. Discuss the modifications and enhancements required to adapt UNIX for real-time applications. Analyze the advantages and limitations of using UNIX in real-time environments.	10

SECTION C**3. Attempt any one part of the following:**

a.	Describe the periodic task model in real-time systems. Discuss how this model helps in the scheduling of tasks and the management of system resources.	10
b.	Analyze the impact of missing a deadline in both hard and soft real-time systems. Discuss the potential consequences in terms of system performance, safety, and reliability.	10

4. Attempt any one part of the following:

a.	Evaluate the optimality of the Earliest-Deadline-First (EDF) and Least-Slack-Time-First (LST) scheduling algorithms. Discuss the theoretical foundations of these algorithms and compare their effectiveness in ensuring that tasks meet their deadlines.	10
b.	Describe the Rate Monotonic Algorithm (RMA) for real-time scheduling. Explain its principles and analyze its strengths and limitations. Compare RMA with the Effective-Deadline-First (EDF) algorithm, discussing scenarios where one might be preferred over the other.	10



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TIME: 3 HRS**M.MARKS: 100****5. Attempt any one part of the following:**

a.	Explain non-preemptive critical sections and their role in real-time systems. Discuss the advantages and disadvantages of using non-preemptive critical sections	10
b.	Discuss the priority-ceiling protocol and its variations. Compare the basic priority-ceiling protocol with the stack-based priority-ceiling protocol. Explain the differences between these protocols and analyze their advantages and disadvantages in managing resource access in real-time systems.	10

6. Attempt any one part of the following:

a.	Analyze the model of real-time communication. Describe the key components and processes involved in ensuring timely and reliable communication in real-time systems.	10
b.	Explain the weighted round-robin service discipline and its application in switched networks for real-time communication. Compare this approach with priority-based service disciplines and discuss their respective advantages and disadvantages.	10

7. Attempt any one part of the following:

a.	Describe the characteristics of temporal data in real-time databases. Discuss how temporal data differs from traditional data and the challenges involved in managing temporal data in real-time systems.	10
b.	Discuss concurrency control in real-time databases. Explain the challenges of managing concurrent access to data in a real-time environment and the techniques used to address these challenges.	10