PAPER ID-310339

Subject Code: KOT075

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM VII) THEORY EXAMINATION 2023-24
REAL TIME OPERATING 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. **2 x 10 = 20**

Q no.	Question	Marks
a.	What is the need for a Real-Time Operating System (RTOS) ?	2
b.	Provide examples of applications where real-time systems are crucial.	2
c.	Discuss the differences between hard real-time and soft real-time systems.	2
d.	What are the key performance metrics used to evaluate the effectiveness of a Real-Time Operating System (RTOS)?	2
e.	Define interrupt routines and their role in handling hardware and software events in an RTOS.	2
f.	Explain the concept of task priority and how it influences task scheduling and execution.	2
g.	Discuss the key differences between real-time databases and general-purpose databases.	2
h.	Discuss the advantages and challenges associated with storing and managing data primarily in main memory.	2
i.	Discuss the importance of understanding failure causes in the context of fault tolerance.	2
j.	Write various fault detection methods employed in fault tolerance.	2

SECTION B

2. Attempt any *three* of the following: **10 x 3= 30**

a.	Compare and contrast the features of General-Purpose Operating Systems (GPOS) and Real-Time Operating Systems (RTOS).	10
b.	Explain the concept of a cyclic executive scheduling algorithm.	10
c.	Explain the role of messages, queues, mailboxes, and pipes in a Real-Time Operating System. How do these features facilitate communication between tasks?	10
d.	How are transaction priorities assigned, and how do they influence the scheduling and execution of transactions in RTOS?	10
e.	Define different types of faults, including hardware faults, software faults, and transient faults.	10

SECTION C

3. Attempt any *one* part of the following: **10 x 1= 10**

a.	Explain how factors such as task scheduling, interrupt handling, and resource management can impact the real-time performance of an RTOS.	10
b.	Provide an overview of the LINUX/UNIX operating system.	10

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4. Attempt any *one* part of the following: 10 x 1= 10

a.	Discuss scenarios where Rate Monotonic Scheduling is suitable and its impact on system performance.	10
b.	How does Least Laxity Scheduling prioritize tasks based on their laxity, and what advantages does this approach offer?	10

5. Attempt any *one* part of the following: 10 x 1= 10

a.	Explain the trade-offs involved in RTOS design decisions and their impact on system performance.	10
b.	Explain how timers are used to enforce timing constraints and deadlines.	10

6. Attempt any *one* part of the following: 10 x 1= 10

a.	Discuss the advantages and disadvantages of each concurrency control approach in real-time databases.	10
b.	Provide an overview of disk scheduling algorithms used in real-time databases.	10

7. Attempt any *one* part of the following: 10 x 1= 10

a.	Explain the strategies and mechanisms used to contain faults and prevent them from spreading to other parts of the system.	10
b.	Explain how time redundancy techniques, such as retry mechanisms and time-based voting, are used to address transient faults.	10