

C.U.SHAH UNIVERSITY

Wadhwan City

Summer Examination-2014

Date: 02/07/2014

Subject Code : STE02RTS1

Subject Name:- Real Time System

Branch/Semester:- M.Tech(CE) /II

Examination: Regular

Time:02:00 To 5:00

Instructions:-

- (1) Attempt all Questions of both sections in same answer book / Supplementary
- (2) Use of Programmable calculator & any other electronic instrument is prohibited.
- (3) Instructions written on main answer Book are strictly to be obeyed.
- (4) Draw neat diagrams & figures (If necessary) at right places
- (5) Assume suitable & Perfect data if needed

SECTION-I**Q-1 Answer the following.**

- (a) Every safety critical real time system contains a fail safe state. Justify. **1**
- (b) Soft real time tasks do not have any associated time bounds. Justify. **2**
- (c) What do you mean by a real-time system? Explain. **2**
- (d) Discuss issues in real-time system scenario. **2**

Q-2 Answer the following.

- (a) A real-time system consists of three tasks T₁, T₂, and T₃. Their characteristics have been shown in the following table. **5**

Task	Phase (ms)	Execution Time (ms)	Relative Deadline (ms)	Period (ms)
T ₁	20	10	20	20
T ₂	40	10	50	50
T ₃	70	20	80	80

Suppose the tasks are to be scheduled using a table-driven scheduler.

Compute the length of time for which the schedules have to be stored in the precomputed schedule table of the scheduler.

- (b) What is a “fail-safe” state? Since safety-critical systems do not have a fail-safe state, how is safety guaranteed? Give an example of an extremely safe but unreliable system. **5**
- (c) Explain the important differences between hard, firm and soft real time systems. **4**

OR**Q-2 Answer the following.**

- (a) Explain scheduling point of a task scheduling algorithm. How the scheduling points are determined in (i) clock-driven, (ii) event-driven, (iii) hybrid schedulers? Can we consider EDF as a dynamic priority scheduling algorithm for Real-time tasks. **5**
- (b) List and explain with example different types of timing constraints that can occur in a real-time system. **5**
- (c) Draw and explain structure or block diagram of Real time system or the components of the RTS. **4**

Q-3 Answer the following.

- (a) Explain all types of task classes in real time system. Write down the distinguish characteristics of all. **7**



- (b) A preemptive static priority real time task scheduler is used to schedule two periodic tasks T1 and T2 with below given characteristics: 7

Task	Phase(ms)	Execution Time(ms)	Relative Deadline(ms)	Period (ms)
T1	0	10	20	20
T2	0	20	50	50

Assume T1 has higher priority than T2. A Background task arrives at time 0 and would require 1000 msec to complete. Compute the completion time of the background task assuming that context switching takes no more than 0.5 msec.

OR

Q-3 Answer the following.

- (a) Explain priority inversion in the context of real-time scheduling. What can be the types of priority inversions that a task might undergo on account of a lower priority task under PCP? 7
- (b) Determine whether the following set of periodic real time tasks is schedulable on a uniprocessor using RMA? 7
- Liu and Layland's test and Lehoczky's test.

SECTION-II

Q-4 Answer the following.

- (a) Under PCP, the highest priority task does not suffer any inversions when sharing certain critical resources. 1
- (b) Justify "Computation intensive tasks dynamically take on higher priorities in Unix." 2
- (c) In real-time applications, a set of temporal data that is absolutely consistent is guaranteed to be relatively consistent. 2
- (d) List the important differences between a real-time database and a conventional database. 2

Q-5 Answer the following.

- (a) What are the drawbacks in using Unix kernel for developing real-time applications? 5
- (b) How are deadlocks, unbounded priority inversions, and chain blocking prevented using PCP? Can PIP and PCP be considered as greedy algorithms? 5
- (c) Differentiate synchronous and asynchronous I/O. Which one is better suited for use in real-time applications? 4

OR

Q-5 Answer the following.

- (a) With respect to the communication overhead and the scheduling proficiency, discuss the relative merits of the focused addressing and bidding and the buddy schemes. 5
- (b) Discuss which category of concurrency protocol is best suited under what circumstances? 5
- (c) Explain the differences between a system call and a function call. What problems may arise if a system call is made indistinguishable from a function call? 4



Q-6 Answer the following.

- (a) The following table shows the details of tasks in a real-time system. The tasks have zero phasing and repeat with a period of 90 ms. Determine a feasible schedule to be used by a table-driven scheduler. 7

Task	Computation Time e_i (ms)	Deadline d_i (ms)	Dependency
T_1	30	90	-
T_2	15	40	T_1, T_3
T_3	20	40	T_1
T_4	10	70	T_2

- (b) What is meant by QoS routing? Define the concepts of additive, multiplicative and concave constraints that are normally used in QoS routing schemes. 7

OR

Q-6 Answer the following.

- (a) Explain in detail Resource reSerVation Protocol (RSVP). 7
- (b) Explain Windows as a Real-Time Operating Systems 7

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