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Total Number of Pages:2

M.TECH  
CSPE101

**1st Semester Regular/Back Examination – 2015-16**  
**REAL TIME SYSTEMS**

**BRANCH(S): COMPUTER SCIENCE AND ENGINEERING,COMPUTER SCIENCE,INFORMATION TECHNOLOGY**

**Time: 3 Hours**

**Max marks: 70**

**Q.CODE:T1262**

**Answer Question No.1 which is compulsory and any five from the rest.**  
**The figures in the right hand margin indicate marks.**

- Q1 Answer the following questions: (2 x 10)
- Why are algorithms which can satisfactorily schedule real-time tasks on multiprocessors not satisfactory to schedule real-time tasks on distributed systems?
  - Why It is difficult to achieve software fault tolerance as compared to hardware fault tolerance?
  - Can we consider EDF as a dynamic priority scheduling algorithm for real-time tasks? Justify your answer
  - Differentiate between firm real time & hard real time system.
  - What is a clock-driven scheduler and how it is different from the event-driven scheduler?
  - What are the two main purpose of using clocks in distributed real time system?
  - Distinguish traffic shaping and policing.
  - Is it true that even in uniprocessor systems multithreading can result in faster response times compared to single-threaded tasks?
  - Can a task undergo Chain Blocking in Highest Locker Protocol (HLP)? Justify your answer.
  - What is meant by QoS routing?
- Q2 a) Describe any two traffic specification models which can satisfactorily be used to specify bursty traffic in Real Time Communication. (5)
- b) List & Explain the different types of timing constraints that can occur in a real-time system. (5)
- Q3 a) What do you mean by delay jitter in real-time communication? Identify at least two factors which contribute to delay jitter in real-time communications and explain how they cause jitter. (5X2)

- b) Determine whether the following set of periodic real-time tasks is schedulable on a uniprocessor using RMA.

Task	Start Time (ms)	Processing Time (ms)	Period (ms)	Deadline (ms)
T1	20	25	150	100
T2	40	7	40	40
T3	60	10	60	50
T4	25	10	30	20

(5)

- Q4 a) What can be the types of priority inversions that a task might undergo on account of a lower priority task under PCP? (5)
- b) Why is it necessary to synchronize the clocks in a distributed real-time system? Discuss the relative advantages and disadvantages of the centralized and distributed clock synchronization scheme. (5)
- Q5 a) What do you mean by fault tolerance? How fault are classified according to their temporal behavior and output behavior? Discuss various types of redundancies required to design a fault tolerance system. (5)
- b) Traditional 2PL protocol is not suitable for use in real-time databases. Why? (5)
- Q6 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) What are the drawbacks in using Unix kernel for developing real-time applications? (5)
- Q7 a) What do you mean by concurrency control in a real-time database? Explain the different categories of concurrency control protocols that can be used in real-time databases. (5)
- b) A real-time network consists of four nodes, and uses IEEE 802.4 protocol. The real-time requirement is that node  $N_i$  should be able to transmit up to  $b_i$  bits over each period of duration  $P_i$  ms, where  $b_i$  and  $P_i$  are given in the table below. (5)

Node	$B_i$	$P_i$
$N_1$	1K	10000
$N_2$	4K	50000
$N_3$	16K	90000
$N_4$	16K	90000

Compute a suitable TTRT and obtain suitable values of  $f_i$  (total number of bits that can be transmitted by node  $N_i$  once every cycle). Assume that the propagation time is compared to TTRT and that the system bandwidth is 1 Mbps

- Q8 Write the short notes on (Any Two)

(5 x 2)

- Priority Inheritance Protocol (PIP)
- Real time POSIX Standard.
- Characteristics of Real-time system
- Rate monotonic algorithm (RMA).