7th Semester Regular / Back Examination 2015-16
REAL TIME SYSTEMS
BRANCH: CSE, IT
Time: 3 Hours
Max marks: 70
Q.CODE: T348
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)**

   a) Specify the names of any 5 real time operating systems and give a brief comparison between any two of them.

   b) Discuss the limitations of Priority Inheritance Protocol (PIP).

   c) How Unix can be used as a real time operating system?

   d) Enumerate the features of a hard real time database system.

   e) How safety is guaranteed in case of systems that do not have a "fail-safe" state?

   f) Explain briefly the advantages of RMA over EDF.

   g) Give a comparative analysis between pessimistic and optimistic concurrency control protocols used in real time databases.

   h) Differentiate between CBR, VBR and Sporadic traffic.

   i) Why clock synchronization is a critical issue in case of RTS.

   j) Discuss the criteria for RMA schedulability.

Q2 a) With a neat block diagram explain the basic model of a RTS.   **(5)**

   b) Explain the important difference between hard, firm and soft real time systems.   **(5)**

Q3 a) Explain the working principle of PCP in the context of sharing critical resources among real time tasks. Discuss the types of priority inversions that can occur under PCP.   **(5)**

   b) A set of hard real time periodic tasks need to be scheduled on a uniprocessor using RMA. Can the tasks T2 and T3 meet their respective deadlines when PCP is used for resource sharing?   **(5)**

Task	Pi	Ei	R1	R2	R3
T1	400	30	15	20	
T2	200	25	--	20	10
T3	300	40	--	--	--
T4	250	35	10	10	10
T5	450	50	--	--	5

Q4 a) With a suitable example, explain how PIP can lead to deadlocks.   **(5)**

   b) Specify the characteristics of periodic, aperiodic and sporadic real time tasks.   **(5)**

Q5 a) Describe the focused addressing and bidding and buddy algorithm for running a set of real time tasks in a distributed environment. **(5)**

b) Discuss the necessary features that are expected from a Real-Time operating system **(5)**

Q6 a) Briefly indicate how Unix dynamically re-computes task priority values. Why is such re-computation of task priorities required? **(5)**

b) Explain how a real-time database differs from a conventional database? **(5)**

Q7 a) Consider a real-time system whose task characteristics and dependencies are described in the following table. These tasks repeat every 150 msec. Determine a feasible schedule which could be used by a table-driven scheduler. **(5)**

Task	Computation Time (E_i)	Deadline (D_i)	Dependency
T1	10	50	----------
T2	10	80	T1
T3	30	60	T1
T4	50	150	T3, T2
T5	35	140	T2

b) Briefly explain the "Rhealstone Metric" for benchmarking the Real-Time Systems. **(5)**

Q8 **Write short notes on any two:** **(5 x 2)**

a) POSIX

b) Byzantine Clock

c) Quality of Service

d) Chain blocking