Registration no: | | | | | | | | | | |

Total Number of Pages: 2 **M.TECH**
EIPE 204

2nd Semester MTech Regular/Back Examination – 2014-15
REAL TIME INSTRUMENTATION
BRANCH(S): Electronics & Instrumentation
Time: 3 Hours
Max marks: 70
Q.Code:T420

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) What do you mean by Scheduling Point?
b) Compare & contrast Relative and Absolute deadline.
c) Enumerate the 4-tuples of a real-time task.
d) Briefly mention the advantages of RMA over EDF.
e) Differentiate between valid & feasible Schedules.
f) How can you differentiate between “Traditional database” & “Real Time database” ?
g) Write down the names of some contemporary Real-time Operating Systems.
h) What is Context Switching overhead?
i) What are the different applications of Real Time Systems?
j) In a simple priority driven preemptive scheduler the execution time and processing times are 10 m sec, 20 m sec for task T1 and 20 m sec, 50 m sec for task T2 respectively. What will be the total Utilization “U” due to foreground task?

Q2 a) List different types of timing constraints that can occur in a real-time system. (5)

b) In the following, the behaviour of a telephone system is given: (5)

(i) If you press the button of the handset for less than 15 sec, it connects to the local operator. If you press the button for any duration lasting between 15 to 30 sec, it connects to the international operator. If you keep the button pressed for more than 30 sec, then on releasing it would produce the dial tone.

(ii) Once the receiver of the handset is lifted, the dial tone must be produced by the system within 20 sec, otherwise a beeping sound is produced until the handset is replaced.

Draw the EFSM model for the above telephone system.

Q3 a) What do you mean by “Priority Inversion”? What are different types of “Priority Inversions”? Demonstrate with neat diagrams. (5)

b) Briefly explain the "Highest Locker Protocol Scheme" for avoiding Priority Inversion. (5)

Q4 a) In a simple priority driven preemptive scheduler, 2 periodic tasks T_1, T_2 and a background task are scheduled. The periodic task T_1 has the highest priority and executes once every 20 m sec and requires 10 m sec of execution time each time. T_2 requires 20 m sec of processing every 50 m sec. T_3 is a background task and requires 100 m sec to complete. (5)
Assuming that all the tasks start at time zero, determine the time at which T_3 will complete.

b) What do you mean by a Real Time System? Mention salient features and applications of such system. (5)

Q5 a) Why debugging and testing in Real-Time software is difficult? Explain. (5)

b) What do you understand by the "fail-safe" state of a system? Safety-critical real-time applications don't have a fail-safe state. Explain. (5)

Q6 a) Draw a neat diagram for the basic model of a Real Time System. Explain each functional block in detail. (5)

b) What is QoS framework? Describe its different elements. (5)

Q7 a) What is POSIX ? What are the specific requirements for POSIX-RT for Real-time operating system? (5)

b) Distinguish between the following: (5)
i) Priority Inheritance Protocol (PIP) and Highest Locker Protocol (HLP)
ii) Soft Real-Time communication and Hard Real-Time communication.

Q8 Answer the following **(Any Two)** (5 x 2)
Write Short Notes on**:**

a) Concurrency control in Real Time databases.
b) Types of RT systems based on stimulus and response characteristics
c) Issues in designing Real Time Database applications
d) Rate Monotonic Algorithm (RMA)