Paper Code: MCA-E34	Roll No.									

M.C.A.
(SEM V) ODD SEMESTER EXAMINATION 2015-16
REAL TIME SYSTEMS

[Time: 3 hrs.] **[Max. Marks: 100]**

Note- Attempt All Questions. All Questions carry equal marks:-

1. **Attempt any four parts:** **5X4=20**

   (a) What do you mean by Real Time System? How is the concept of real-time different from the traditional notion of time?
   (b) Using the block diagram show the important hardware components of real time and their interactions? Explain the roles of the different components.
   (c) Differentiate between hard real-time soft real-time and firm real-time systems.
   (d) Explain using suitable circuit diagram how digital to analog (DAC) conversion can be achieved in an output interface.
   (e) What do you understand by the fail-safe state of a system? "Safety critical real time systems do not have a fail-safe state." What is the implication of this?
   (f) What is safety-critical system? Are all hard real time systems safety critical?

2. **Attempt any four parts:** **5X4=20**

   (a) What are the different types of real time task? Discuss their characteristics.
   (b) How to classify real time task scheduling algorithms.
   (c) What do you mean by static and dynamic scheduling? Explain.
   (d) What is RMA and discuss its necessary condition for schedulability?
   (e) Briefly describe the Earliest Deadline First (EDF) scheduling. Consider the following three periodic real time tasks to be scheduled using EDF on a uniprocessor:
   $T_1=(e_1=10, p_1=20)$, $T_2=(e_2=5, p_2=50)$, $T_3=(e_3=10,p_3=35)$. Determine whether the task set is schedulable or not.
   (f) "While scheduling a set of hard real time periodic tasks, why RMA cannot achieve 100% processor utilization without missing task deadline." Briefly explain.

3. **Attempt any four parts:** **5X4=20**

   (a) What do you understand by the term *priority inversion* in the context of real time task scheduling?
   (b) Explain the operation of priority ceiling protocol (PCP) in sharing critical resources among real time task.
   (c) What do you understand by inheritance-related inversion?
   (d) What is Highest Locker Protocol (HLP)? Explain.
   (e) Discuss different types of priority inversions under PCP.
   (f) What are the issues in using a resource sharing protocol?

4. Attempt any two parts: **10X2=20**

(a) Compare the performance of IEEE 802.4 protocol with IEEE 802.5 protocol for real time application at high, medium and low bandwidths.
(b) Discuss advantages and disadvantages of using a ring network and collision based network for real time communication.
(c) What do you understand by QoS routing? Discuss with examples of additive, multiplicative and concave constraints that are used in QoS routing scheme.

5. Attempt any two parts: **10X2=20**

(a) What is POSIX? Discuss the real time POSIX standards?
(b) Explain various features of real time operating system.
(c) Write short notes on
    i) VRTX
    ii) QNX
    iii) RT Linux