Seventh Semester B.Tech. Degree Examination, November 2017  
(2013 Scheme)  
13.705.3 – REAL TIME OPERATING SYSTEMS (T)  

Time : 3 Hours  
Max. Marks : 100  

PART – A  

Answer all questions. Each question carries 2 marks.  

1. Distinguish between kernel mode and user mode.  

2. What is a system call in an Operating System?  

3. What is a re-entrant function?  

4. What are the states of an RTOS task?  

5. Explain main feature of Pipe method of inter task communication.  

6. What is processor utilization factor?  

7. Discuss a rendezvous model of communication.  

8. What is a task control block in an Operating System?  

9. What are advantages of pre-emption in task scheduling?  

10. Why is interrupt latency important for RTOS performance?  

(2x10=20 Marks)
PART - B

Answer any one question from each Module.

Module - I

11. a) Explain two models of inter-process communication. 10
     b) Distinguish between single threaded and multi-threaded processes. What is
        the impact of multi-core hardware on such processes? 10

     OR

12. a) Explain shared data problem with the help of an example. 10
     b) Show how critical section and atomicity can be used to solve shared data
        problem with the help of an example. 10

Module - II

13. a) Discuss deadlocks using the Dining Philosopher example. Explain deadlock
      prevention and deadlock avoidance methods in an RTOS. 15
     b) What is a semaphore? What are the different types of semaphores? 5

     OR

14. a) What is the difference between an interrupt and an exception? 5
     b) What are the steps in handling an interrupt in an RTOS? 5
     c) What is interrupt masking? 5
     d) How does pre-emption affect interrupt handling? 5

Module - III

15. Consider an RTOS with two processes P1 and P2. The period p and execution
     time t in milliseconds for P1 and P2 are as follows. p (P1) is 50 ms, t (P1) is 25 ms;
     p (P2) is 80 ms, t (P2) is 35 ms. For this RTOS, answer these questions.
     i) Calculate the CPU utilization ratio for these two processes. 4
     ii) Draw and explain the schedule using Rate Monotonic algorithm. 8
     iii) Draw and explain the schedule using Earliest Deadline First Algorithm. 8

     OR
16. a) What by Earliest deadline first scheduling? 5

b) What is CPU utilization ratio? How do you calculate worst case CPU utilization ratio? 5

c) For a set of tasks A, B, C and D with execution times 1, 2, 3 and 3 milliseconds and periods 2, 10, 15 and 30 milliseconds respectively, answer these following questions:
   i) What is the CPU utilization ratio? 5
   ii) Schedule these tasks using a scheduling algorithm of your choice. 5

Module – IV

17. a) Draw and explain the state transitions of a real-time kernel. 10

b) What are the requirements of an embedded system? How does and Embedded operating system differ from a regular operating system? 10

OR

18. a) Explain the components of a Unix Operating System. 10

b) What are the system overheads in an Operating System. 10