Seventh Semester B.Tech. Degree Examination, July 2019
(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. List four tasks to be performed by memory management unit.
2. What is an atomic transaction for a database system?
3. What is a counting semaphore?
4. What is preemption in RTOS?
5. Compare static and dynamic priority scheduling algorithms.
6. What is a mailbox method of communication scheduling?
7. What are the meant by deadline monotonic scheduling?
8. What are the different process states in an RTOS?
9. What are the overheads for an RTOS?
10. Name two commercial Real Time Operating Systems.

(10 x 2 = 20 Marks)

P.T.O.
PART – B

Answer any one full question from each Module.

Module – I

11. (a) Explain the steps in handling an interrupt in an Operating System.  
(b) Explain with a diagram the states and transitions of a process.  

OR

12. (a) Draw and explain the architecture of a typical Operating System.  
(b) What are the differences between a process and a thread?

Module – II

13. (a) What is meant by re-entrant function?  
(b) How does semaphores help re-entrancy?  
(c) Distinguish between an regular OS and a Real Time OS. Discuss applications where RTOS would be preferred over regular OS.

OR

14. (a) What is a Real Time Operating Systems? Explain tasks and task states using a state transition diagram.  
(b) Distinguish between a hard and soft Real Time Operating Systems.

G – 3788
Module – III

15. Consider an RTOS with two processes P1 and P2. The period P and execution time t for P1 and P2 are as follows. p(P1) is 50 ms, t(P1) is 20ms; p(P2) is 100ms, t(P2) is 50ms. For this RTOS, answer these question.

(a) Calculate the CPU utilization ratio. 4
(b) Draw and explain scheduling activity if P2 has higher priority over P1. 8
(c) Draw and explain the schedule if Rate Monotonic scheduling is used. 8

OR

16. (a) Explain Rate Monotonic scheduling algorithm with an example. 8

(b) Given a set of five tasks with the dependencies (Z->Y means task Z cannot be scheduled before a task Y runs to completion) and execution times, answer the following questions.

Dependencies are C->B->A,Z->Y->A

Execution times in milliseconds of A, B, C, Y and Z are 1, 2, 2, 3, and 1 respectively.

(i) Write all the possible schedules if each task can be run only once. 6
(ii) If the allowed total execution time is 10 ms, which schedule would have the most number of tasks in the case. 3
(iii) If task Z has a higher priority than task C, which all schedules from case (i) will be valid. 3

Module – IV

17. (a) Explain the inter process communication mechanisms of a kernel. 10

(b) Explain the components of a Unix Operating System. 10

OR

18. (a) Choose an RTOS application of your choice and explain the scheduling related contraints that might occur in this application. 10

(b) What are the components of a typical embedded system? How do they differ from a general purpose computer? 10