PART – A

Answer all questions. Each question carries 4 marks.

1. How is real-time OS different from other operating systems? Name two real time operating systems that are commercially available. 4

2. Explain the important services of a real time operating system. 4

3. What is a non-entrant code? Explain. 4

4. With a neat diagram, explain the invocation of an OS service through a system call. 4

5. Explain the pros and cons of supporting virtual memory in real time applications. 4

6. Explain the time services that a real time OS is expected to support. 4

7. Briefly explain earliest deadline first algorithm. 4

8. What is priority driven scheduler? Explain. 4

9. What are the differences between traps and interrupts? Give an example of each. 4

10. Explain the issues involved in designing a kernel for Real time operating system. 4

P.T.O.
PART – B

Answer **any two** questions from each Module. **Each** question carries 10 marks.

**Module – I**

11. a) Explain the differences between hard, firm and soft real time tasks. 3

   b) Describe the actions taken by a kernel to context switch between processes. 7

12. a) Explain different operations on processes. 5

   b) What do you mean by critical section? Explain. 5

13. A fast food restaurant has four kinds of employees: (1) order takers, who take customer’s orders; (2) cooks, who prepare the food; (3) packaging specialists, who stuff the food into bags; and (4) cashiers, who give the bags to customers and take their money. Each employee can be regarded as a communicating sequential process. What form of interprocess communication do they use? Relate this model to processes in operating system. 10

**Module – II**

14. a) Explain the basic services provided by a Real Time Operating System. 6

   b) Explain the interrupt mechanism in RTOS. 4

15. a) Most RTOSs offer a semaphore or mutex mechanism for handling negative synchronization. Explain the need for this. 6

   b) Explain the process of creating and destroying tasks. 4
16. Given is a set of 6 aperiodic tasks named A, B, C, D, E and F with the following precedence relations:
   A → B, A → C, B → D, B → E, C → F
   The execution times C, arrival times r and absolute deadlines d are as follows:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
</table>
   C | 2 | 2 | 2 | 2 | 2 | 2 |
   d | 4 | 10| 8 | 6 | 10| 12|
   r | 0 | 1 | 1 | 3 | 7 | 9 |

   a) Draw the schedule for the case when the EDF policy ignores any precedence constraints.

   b) Draw the schedule for the case when the EDF policy releases a task after all its predecessors (defined by the precedence constraints above) have finished execution.

   **Module – III**

17. With a neat diagram, explain the structure of a real time kernel.

18. Explain the intertask communication and synchronization methods used in RTOS.

19. Explain the features of QNX Nutrino 2 and Micro C/OS-II.