

## Additional RT-Scheduling and Multitasking Problems

### COE718 – Embedded Systems Design

**Q. 1.** Suppose we run each of the scheduling algorithms (FCFS, RR, Fixed Priority-based) in a system that is very heavily overloaded. Describe how each of these algorithms will act in the face of overloading. Discuss how this overloading affects the average waiting time of short jobs, medium jobs, and long jobs (if they are affected differently). In other words, discuss how the average waiting time changes (for short, medium, and long jobs) when going from a lightly loaded system to a heavily loaded system. Make sure to discuss the overhead of extra context switches caused by the scheduling algorithm (if any).

**Q. 2.** Consider two jobs, A and B, in a deadline scheduling system. The deadline for A is before the deadline for B. Explain why we should run A before B, that is, show that if running A then B fails to meet some deadline then running B before A will also fail to meet some deadline.

**Q. 3.** Consider a set of five aperiodic tasks with their execution profiles given below. Develop the scheduling diagram of these processes employing EDF Scheduling.

Process	Arrival Time	Execution Time	Starting Deadline
A	10	20	100
B	20	20	30
C	40	20	60
D	50	20	80
E	60	20	70

**Q. 4.** Consider three processes P, Q and S. P has a period of 100msec in which it requires 30msecs of processing. The corresponding values for Q and S are (6, 1) and (25, 5) respectively. Assume, P is the most important process in the system, followed by Q and then S.

- i. What is the process utilization of P, Q and S.
- ii. How the process should be scheduled so that all deadlines are met.
- iii. Illustrate one of the schemes that allow these processes to be scheduled.

**Q. 5.** The process set shown in Table below is not schedulable using the utilization criterion because process, **a** must be given the top priority due to its criticality. How can the process set be transformed to make it schedulable? The computations represented by process; **a** must still be given top priority.

Process	Period	Execution Time	Criticality
a	60	10	HIGH
b	10	3	LOW
c	8	2	LOW