

Motilal Nehru National Institute of Technology Allahabad
Prayagraj-211004 [India]

Mid Semester Examination (2023-24)

Programme Name: M.C.A
Course Code: CS33101
Branch: N.A
Duration: 90 Minutes

Semester: III

Course Name: Operating Systems

Student Reg. No.: 2022CA023

Max. Marks: 25

Instructions: (1) All questions are compulsory. (2) Figures to the right indicate the full marks.

1. What is an operating system and why do we need it? Describe the three main objectives of operating system. [4]
2. Consider the Four processes; all arrives at time zero, with total execution time of 10, 50, 45 and 50 units, respectively. Each process spends the first 20% of execution time doing I/O, the next 60% of time doing computation and the last 20% of the time doing I/O again. The operating system uses a shortest remaining time first algorithm (SRTF) and schedules a new process either when the running process gets blocked on I/O or when the running process finishes its burst. Consider that ties are broken by giving priority to the process with the highest process id. Assume that all I/O operations can be overlapped as much as possible. For what percentage of time does the CPU remains idle? 1.064 [4]
3. Suppose that the following processes arrive for execution at the times indicated. Each process will run for the amount of time listed. In answering the question, use nonpreemptive scheduling, and base all decisions on the information you have at the time the decision must be made:

Process	Arrival Time	Burst Time
P ₁	0.0	8
P ₂	0.4	4
P ₃	1.0	1

- a. What is the average turnaround time for these processes with the FCFS scheduling algorithm? 10.53

$$\begin{array}{r} 11.6 \\ 8.0 \\ \hline 19.6 \\ 12.0 \\ \hline 31.6 \end{array}$$

$$\begin{array}{r} 47.4 \\ 6 \\ \hline 282 \end{array}$$

$$\begin{array}{r} 97.4 \\ 4 \\ \hline 1.064 \\ 50 \\ \hline 47.4 \end{array}$$
$$\begin{array}{r} 300 \\ 282 \\ \hline 18 \end{array}$$

- b. What is the average turnaround time for these processes with the SJF scheduling algorithm?
- c. The SJF algorithm is supposed to improve performance, but notice that we chose to run process P_1 at time 0 because we did not know that two shorter processes would arrive soon. Compute what the average turnaround time will be if the CPU is left idle for the first 1 unit and then SJF scheduling is used. Remember that process P_1 and P_2 are waiting during this idle time, so their waiting time may increase. This algorithm could be known as future - knowledge scheduling [6]
4. Define the different states of a process. with diagram. Explain the need of process suspension. [4]
5. What is System Call? why do OS needs system Call? Why do kernel Processes not need to make System Calls? [4]
6. What is a Device Driver and what are its function? [3]

$$\begin{array}{r}
 14.0 \\
 5.6 \\
 \hline
 19.6 \\
 3.6 \\
 \hline
 22.6
 \end{array}$$