

INSTRUCTIONS

1. Write your name, Registration number, and section details on top of the first page and place your signature.
2. Write the Title “FISAC – Principles of Operating Systems (ICT 3122)” and date, on the front page.
3. Write answers to all the questions neatly on A4 sheets.
4. Numerical must be solved in a detailed manner, include diagrams, tables wherever required. Each question carries 2marks.
5. Submit your own hand-written answers towards FISAC on or before 22.10.2024 to your respective teacher.
6. No xerox or printed copy is allowed. No deadline extension. For late submissions, direct copy of the content as it is from the resource, marks will be deducted as per the number of days delayed and based on the % of similarity.
7. Ensure that your writing is clear and easy to read.

QUESTIONS

1. Compare and contrast different disk scheduling algorithms such as FCFS, SSTF, SCAN, C-SCAN, and LOOK. Consider disk requests: 118, 203, 57, 142, 34, 144, 85, 87. Starting from the current head position 86, What is the total distance that the disk arm moves to satisfy all the pending requests for each of the disk algorithms mentioned above? Which algorithm is preferred? Justify your answer.
2. How does the design of the kernel, process management, file management and security mechanisms differ between UNIX-based operating systems such as Linux, traditional Windows operating systems and macOS? Discuss the implications of these differences on system administration practices, user experience, and overall system reliability. Why Windows operating system is popular among all the three?
3. Explain various types of tasks and task scheduling in real time operating systems. How does scheduling in real-time operating systems (RTOS) differ from scheduling in general-purpose operating systems? Discuss the unique challenges and requirements of real-time systems that influence scheduling decisions and analyse the impact of these differences on system performance, predictability, and responsiveness."
4. Compare Rate monotonic Scheduling (RMS) and Earliest Deadline First (EDF) scheduling used in real time operating systems. A cyclic real time scheduler is to be used to schedule three periodic tasks T1, T2 and T3 with following characteristics. Determine whether the task set is schedulable. If yes, illustrate the scheduling of these tasks using EDF schedule.

Task	Phase(msec)	Execution time(mSec)	Relative Deadline(mSec)	Period(mSec)
T1	0	10	120	120
T2	0	20	90	90
T3	0	30	140	140

5. Three processes A, B and C each execute a loop of 100 iterations. In each iteration of the loop, a process performs a single computation that requires t_c CPU milliseconds and then initiates a single I/O operation that lasts for t_{io} milliseconds. It is assumed that the computer where the processes execute has sufficient number of I/O devices and the OS of the computer assigns different I/O devices to each process. Also, the scheduling overhead of the OS is negligible. The processes have the following characteristics: The processes A, B, and C are started at times 0, 5 and 10 milliseconds respectively, in a pure time-sharing system (round robin scheduling) that uses a time slice of 50 milliseconds. Find the time in milliseconds at which process A, B and C would complete its first I/O operations. Assume that all the processes start their I/O intense operations only after their CPU intense operations are complete.

Process	t_c	t_{io}
A	100ms	500ms
B	350ms	500ms
C	200ms	300ms