Question Paper

Exam Date & Time: 11-Jan-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIFTH SEMESTER B.TECH. DEGREE EXAMINATIONS -JANUARY 2024
SUBJECT: CSE 3153- OPERATING SYSTEMS

Marks: 50   **Duration: 180 mins.**

Answer all the questions.

1A)	To ensure the proper execution of the operating system there must be a way to distinguish between the execution of operating-system code and user defined code. How is this provided in the operating system through the hardware? Also explain the transition between the two codes.	(3)
1B)	Explain the microkernel structure with diagram, benefits and detriments.	(2)
i)		
ii)	Consider process P_0 is interrupted during its execution and there is a context-switch to another Process P_1 by the CPU. Describe the action taken by a kernel to context-switch between the processes with a diagram	(2)
1C)	Justify how exclusive access of the database is being used in first readers-writers problem and second reader-writer problem with an appropriate synchronization technique. Explain disadvantages of both.	(3)
2A)	Explain the concept of deadlocks in operating systems, identifying the fundamental conditions that must simultaneously exist for a deadlock to occur. Evaluate the implications of deadlocks and the strategies employed to prevent from them.	(4)
2B)	Consider the set of 5 processes whose arrival and burst time are given below. If the CPU scheduling policy is Round Robin with time quantum = 2 units. Calculate the Average Wait time and the Average Turn Around time.	(3)

Process ID	Arrival Time	Burst Time
P1	0	5
P2	1	3
P3	2	1
P4	3	2
P5	4	3

2C)	Describe the steps in handling page faults.	(3)
3A)	Explain with required illustrations as to how access matrix can be expanded to add, delete access rights.	(3)
i)		
ii)	Explain the implementation of access matrix where a combination of access lists and capabilities is used.	(2)
3B)	Elaborate on two levels of internal tables maintained by the operating system to handle file system.	(3)
i)		

ii)	Discuss the advantages and disadvantages of present systems having automatic features of opening and closing a reference file compared to the traditional approach of opening and closing the file explicitly.	(2)
4A)	Discuss how demand paging affects system performance.	(4)
4B)	Explain the thrashing phenomenon in demand paging systems and describe the different techniques that can be used to control it.	(4)
4C)	Consider a reference string: 4, 7, 6, 1, 7, 6, 1, 2, 7, 2. the number of frames in the memory is 3. Find out the number of page faults respective to FIFO Page Replacement Algorithm.	(2)
5A)	How do we solve the problem of allocating fixed physical memory among multiple processes in a multi-programming environment with the concept of demand paging? Consider a system with a 1 KB frame size. If process P1 of size 10KB and process P2 of size 127 KB are running in a system having 62 free frames, how many frames would be allocated to each process in the case of the above-explained algorithms?	(4)
5B)	Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive currently serves a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from the current head position, what is the total distance (in cylinders) the disk arm moves to satisfy all the pending requests, for each of the following disk-scheduling algorithms? (Show diagram) i) Look ii) C Scan Also analyse the differences between these two algorithms.	(4)
5C)	How might OS detect that thrashing is occurring? How would it show up in the page fault frequency?	(2)

-----End-----