SASTRA DEEMED UNIVERSITY

(A University under section 3 of the UGC Act, 1956)

End Semester Examinations

May 2023

Course Code: **CSE308**

Course: **OPERATING SYSTEMS**

QP No. :**U344-4**

Duration: **3 hours**

Max. Marks:**100**

PART – A

Answer any Four questions　　　　　　　　**4 x 20 = 80 Marks**

1. (a) Describe the needs, mechanisms and benefits of system calls with their types and suitable examples for each type. State the role of APIs in invoking system calls. (12)

   (b) Consider a file copy operation in which the program gets a file name from user, opens the file, reads its content, opens another file, moves the content of first file into second and then erase the content of first file. List out all the possible system calls involved in this scenario. (8)

2. (a) Compare the methods of inter-process communication based on their characteristics with the system calls used in each method with their function, syntax, parameters and return values. (10)

   (b) Consider the following set of processes. Apply preemptive SJF and RR (time quantum=2) and find out which algorithm produces the lowest average turnaround time. Provide the Gantt chart for each scheduling. (10)

Process	Arrival time	Burst time
P0	2	2

P1	1	5
P2	4	3
P3	1	4

3. (a) State the reader-writer problem and derive a solution based on semaphore which ensures that writers don't starve when readers keeps returning to read, by allowing the waiting writer to enter critical section after every five readers have read the file. (10)

(b) Develop a semaphore based solution for the bounded buffer producer consumer problem in which there are two buffers of equal size available. If first buffer is full then producer can put data in second buffer. Similarly, if first buffer is empty consumer may check availability of data in second buffer. Only when both buffers become full or empty, you will have to block either the producer or the consumer. (10)

4. The following table represents the list of processes with their resource needs and allocations. Construct the Need matrix comprising of current requirements. Find out whether the system is in safe state or not. Determine whether it is safe to allocate resource to P3(1,1,0) and P1(2,0,0). Justify your answer. Write the banker's algorithm.

	Max A B C	Allocation A B C	Available A B C
P0	4 3 3	1 1 2	
P1	3 2 2	2 1 2	
P2	9 0 2	4 0 1	
P3	7 5 3	0 2 0	
P4	1 1 2	1 1 2	2 1 0

5. (a) Compare paging and segmentation. (8)
   (b) Compute the number page faults for 4 frames under Optimal, LRU and FIFO page replacement algorithms for the following

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page reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2 and 3.

(12)

6. (a) Explain the types of threads with the two possible thread scheduling strategies. (10)

(b) Develop a program to demonstrate the creation of child process using fork. Explain the zombie process and orphan process concepts through that program. (10)

PART – B

Answer the following **1 x 20 = 20 Marks**

7. (a) Draw the process state diagram with all possible states. (5)

(b) Consider that the order of requests for disk access are as follow:55, 58, 39, 18, 90, 160, 150, 38 and 184. The current position of the head is at 100. Calculate the seek time based on FCFS, SSTF, SCAN and CSCAN algorithms. Range[0-199](10)

(c) Mention the file allocation methods with a brief explanation for each method. (5)

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