

SASTRA DEEMED UNIVERSITY

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

End Semester Examinations

Dec 2023

Course Code: CSE308

Course: OPERATING SYSTEMS

QP No. :UD302-5

Duration: 3 hours

Max. Marks:100

PART - A

Answer all the questions

10 x 2 = 20 Marks

1. State the role of dual mode operation in computer protection.
2. Name the different types of user interfaces provided by operating systems.
3. Identify the various elements that a process comprises.
4. Write the procedure of a producer process that makes use of shared memory-based buffer.
5. Prove that FCFS scheduling algorithm suffers from convoy effect with an example.
6. Write the structure of a process that consist of Peterson's solution for mutual exclusion.
7. Suppose there are four processes P1, P2, P3, P4, and two resources R1 and R2. P1 is holding R1, P2 is holding R2, P3 is waiting for R1 and R2 while P4 is waiting for resource R1. Depict the given scenario through a resource allocation graph and predict whether a deadlock is possible.

8. Consider a 32-bit logical address space with 4 KB page size, if two level hierarchical paging is followed then how the logical addresses will be split?
- 9/ Distinguish between shared lock and exclusive lock for files.
10. State the requirement of copy semantics and how is it achieved.

PART - B

Answer any Four questions

4 x 15 = 60 Marks

11. a) Discuss the various operating system structures with their characteristics. (8)
b) Illustrate various services offered by an operating system. (7)
12. a) Describe the concepts of multithreading, benefits of threads, thread models and thread scheduling. (10)
b) Compare shared memory and message passing based IPC. (5)
- 13/ Compute the average turn-around time for the following list of processes under RR (time quantum=2) and Preemptive SJF.
- | Process | P1 | P2 | P3 | P4 | P5 | P6 | P7 |
|--------------|----|----|----|----|----|----|----|
| Arrival time | 0 | 1 | 3 | 4 | 5 | 6 | 8 |
| Burst time | 4 | 2 | 3 | 2 | 3 | 6 | 4 |
- 14/ a) Develop a solution for the Dining philosopher's problem using semaphore that overcomes the problem deadlock. (8)
b) Discuss the techniques used for structuring the page tables. (7)
- 15/ For the following data verify whether there is any deadlock. Then, for the given requests determine whether the system will be safe or unsafe. Evaluate the three requests separately on the given data and not on the modified data after the first request.

Max			
Process	R1	R2	R3
P1	4	3	5
P2	2	4	3
P3	0	3	2
P4	2	6	2

Allocation			
Process	R1	R2	R3
P1	2	1	3
P2	2	0	1
P3	0	1	1
P4	1	2	1

Available		
R1	R2	R3
2	3	2

- a) P1 requests (0,1,2).
- b) P3 requests (1,1,1).
- c) P4 requests (0,3,1).

16. Discuss the various file access and file allocation methods (10).
 Depict the PCI bus architecture diagram which is used for the interconnection of computer components. (5)

PART – C

Answer the following

1 x 20 = 20 Marks

17. a) Illustrate the role of system calls in an operating system, their types and examples from actual operating systems. For the example of sending an e-mail after attaching a file from the hard disk, list out the possible system calls invoked. (6)
- b) Apply multilevel feedback queue scheduling with three queues from 0 to 2 for scheduling the following processes. The time quantum for a queue is calculated as 2^i where 'i' refers to the queue number. Calculate their turn-around times of processes. (7)

Process	P1	P2	P3	P4	P5
Arrival time	0	2	3	4	5
Burst time	4	12	6	10	2

- c) Consider a disk queue with read/write requests on the following tracks: 6, 10, 12, 54, 97, 73, 128, 15, 44, 110, 34, 45. Assuming

that the initial head position is 23 and total number of tracks as 150, calculate the average seek length using SSTF and C-LOOK. (7)
