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18CS43

Fourth Semester B.E. Degree Examination, July/August 2022 Operating Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Distinguish between the following terms:
 - i) Multi programming and multitasking. (10 Marks)
 - ii) Multi processor systems and clustered systems. (05 Marks)
- b. Define Operating Systems. Explain dual mode of operating systems with a neat diagram. (05 Marks)
- c. Explain about system calls with an example of handling a user application invoking the open() system call. (05 Marks)

OR

- 2 a. What is a process? Illustrate with a neat diagram the different states of a process and control block. (05 Marks)
- b. Discuss the implementation of IPC using message passing systems in detail. (10 Marks)
- c. List and explain the services provided by OS for the user and efficient operation of system. (05 Marks)

Module-2

- 3 a. Give a brief description about multithreading and explain the different multi threading models. (05 Marks)
- b. Discuss the issues that come with multithreaded programming. (10 Marks)
- c. Explain CPU scheduling criteria. (05 Marks)

OR

- 4 a. Calculate the average waiting time and the average turnaround time by drawing the Gantt chart using FCFS, SRTF, RR ($q = 2ms$) and priority algorithms. Lower priority number represents higher priority.

Process	Arrival Time	Burst Time	Priority
P ₁	0	9	3
P ₂	1	4	2
P ₃	2	9	1
P ₄	3	5	4

(12 Marks)

- b. What is critical section problem? What are the requirements for the solution to critical section problem? Explain Peterson's solution. (08 Marks)

Module-3

- 5 a. What is a deadlock? What are the necessary conditions for the deadlock to occur? (05 Marks)
 b. How to prevent the occurrence of deadlock, explain in detail. (05 Marks)
 c. Consider the following snapshot of a system:

Process	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P ₀	2	0	0	1	4	2	1	2	3	3	2	1
P ₁	3	1	2	1	5	2	5	2				
P ₂	2	1	0	3	2	3	1	6				
P ₃	1	3	1	2	1	4	2	4				
P ₄	1	4	3	2	3	6	6	5				

Answer the following using Banker's algorithm.

- i) Is the system in safe state? If so, give the safe sequence. (10 Marks)
 ii) If process P₂ requests (0, 1, 1, 3) resources can it be granted immediately? (10 Marks)

OR

- 6 a. Explain paging hardware with TLB. (05 Marks)
 b. Explain segmentation in detail. (05 Marks)
 c. Discuss structure of page table with suitable diagrams. (10 Marks)

Module-4

- 7 a. Describe the steps in handling page faults. (06 Marks)
 b. Consider the page reference string: 1, 0, 7, 1, 0, 2, 1, 2, 3, 0, 3, 2, 4, 0, 3, 6, 2, 1 for a memory with 3 frames. Determine the number of page faults using FIFO, optimal and LRU replacement algorithms. Which algorithm is most efficient? (14 Marks)

OR

- 8 a. Explain the different allocation methods. (10 Marks)
 b. Discuss the various directory structures with required diagrams. (10 Marks)

Module-5

- 9 a. Explain access matrix method of system protection with domain as objects and its implementation. (10 Marks)
 b. A drive has 5000 cylinders numbered 0 to 4999. The drive is currently serving a request at 143 and previously serviced a request at 125. The queue of pending requests in FIFO order is: 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from current head position, what is the total distance travelled (in cylinders) by disk arm to satisfy the requests using FCFS, SSTF, SCAN, LOOK and C-LOOK algorithms. (10 Marks)

OR

- 10 a. With a neat diagram, explain the components of a Linux system. (08 Marks)
 b. Explain the different IPC mechanisms available in Linux. (06 Marks)
 c. Discuss about scheduling in Linux. (06 Marks)

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