CBCS SCHEME

USN | | | | | | | | | | 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.
ii) Multi processor systems and clustered systems. **(10 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.
ii) If process P_2 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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