CBCS SCHEME

USN | | | | | | | | | | |

21CS44

Fourth Semester B.E. Degree Examination, June/July 2024
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. Compare multiprogramming and Time sharing systems. **(06 Marks)**

b. Illustrate with a diagram the Dual mode operation of an operating system. **(08 Marks)**

c. Point out and explain briefly the various services provided by the operating systems. **(06 Marks)**

OR

2 a. What are system calls? Explain types of system calls. **(06 Marks)**

b. What are microkernels? Point out its benefits. **(06 Marks)**

c. Define Process. What are its states? Explain process state diagram. **(08 Marks)**

Module-2

3 a. What is multithreading? Explain different types of multithreading models. **(08 Marks)**

b. For the following example calculate average waiting time and average turnaround time for the following algorithms.

i) FCFS ii) Preemptive SJF iii) Round Robin (Time quantum = 1 ms)

Process	Arrival time	Burst time
P_1	0	8
P_2	1	4
P_3	2	9
P_4	3	5

(12 Marks)

OR

4 a. Explain Critical Section Problem. What are its requirements? **(08 Marks)**

b. Explain Dining Philosophers problem. Illustrate the solution to Dinning philosopher problem using semaphores. **(12 Marks)**

Module-3

5 a. What is Deadlock? What are its necessary conditions for the occurrence of deadlock? **(08 Marks)**

b. 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	0	0	1	2	0	0	1	2	1	5	2	0
P_1	1	0	0	0	1	7	5	0				
P_2	1	3	5	4	2	3	5	6				
P_3	0	6	3	2	0	6	5	2				
P_4	0	0	1	4	0	6	5	6				

Answer the following question using the Bankers Algorithm.

i) What is the content of Need matrix?

ii) Is the system is in Safe state?

iii) If the request from process P_1 arrives for (0, 4, 2, 0) can the request be granted immediately? **(12 Marks)**

OR

6 a. Given memory partitions of 100K, 500K, 200K, 300K and 600K (in order) how would each of the first fit, best fit and worst fit algorithms place processes of 212K, 417K, 112K and 426K (in order) which algorithm makes the most efficient use of memory. **(06 Marks)**

b. What is paging? With a neat diagram explain Paging hardware. **(08 Marks)**

c. Differentiate between Segmentation and Paging. **(06 Marks)**

Module-4

7 a. What do you mean by Page Replacement? Explain the working of page replacement algorithm with a neat block diagram. **(08 Marks)**

b. Consider the following page-reference string

2, 3, 2, 1, 5, 2, 4, 5, 3, 2, 5, 2

How many page faults occur in the following replacement algorithms, assuming three frames:

i) FIFO ii) LRU iii) Optimal **(12 Marks)**

OR

8 a. Describe the various file allocation methods. Also point out their advantages and disadvantages. **(10 Marks)**

b. Explain the various Free Space Management techniques. **(10 Marks)**

Module-5

9 a. What is disk scheduling? Explain different types of Scheduling algorithms. **(10 Marks)**

b. What is access matrix? How the access matrix is implemented, point out the advantages and disadvantages of different methods of implementation of access matrix. **(10 Marks)**

OR

10 a. Explain the different components of a Linux system. **(10 Marks)**

b. Discuss the Linux file system. **(10 Marks)**

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