CBCS SCHEME

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22MCA12

First Semester MCA Degree Examination, June/July 2023
Operating System Concepts

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define an Operating System. Explain the abstract view of the components of a computer system with a neat diagram.	10	L2	CO1
	b.	Describe the operating system operations with a neat diagram.	10	L2	CO1
		OR			
Q.2	a.	Explain the operating system services.	10	L2	CO1
	b.	Define a system call. Explain the types of system calls.	10	L2	CO1
		Module – 2			
Q.3	a.	Define a process. Explain the different states of a process with a neat diagram.	8	L2	CO2
	b.	Write a C program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time. i) FCFS ii) SJF.	12	L3	CO2
		OR			
Q.4	a.	Define a thread. Explain the benefits of multithreading.	10	L2	CO2
	b.	Describe the different multithreading models.	10	L2	CO2
		Module – 3			
Q.5	a.	Define cooperating process. Discuss the critical section problem and also list the requirements to the solution of critical section problem.	10	L2	CO3
	b.	Define a semaphore. Explain the wait( ) and signal( ) operations. Outline the mutual – exclusion implementation with semaphores.	10	L2	CO3
		OR			
Q.6	a.	Consider the following snapshot of a system:	12	L3	CO3

	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 questions using the Banker's algorithm.

i) What is the content of matrix need?
ii) Is the system in a safe state? If yes, give the safe sequence.
iii) If a request from process P_1 arrives for (0, 4, 2, 0), can the request be granted immediately?

	b.	Explain the steps to recover from a deadlock with an example.	8	L2	CO3
		Module – 4			
Q.7	a.	Write a C program to simulate paging technique of memory management.	10	L3	CO4
	b.	Explain the segmentation hardware with a neat diagram.	10	L2	CO4
		OR			
Q.8	a.	Explain the steps in handling a page fault with a neat diagram.	10	L2	CO4
	b.	Consider the following memory reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 for a memory with three frames. How many page faults will occur with respect to the following page replacement algorithms: i) FIFO page replacement ii) Optimal page replacement iii) LRU page replacement.	10	L3	CO4
		Module – 5			
Q.9	a.	Define a File. List all the attributes of a file.	10	L2	CO5
	b.	Discuss the different operations on a file.	10	L2	CO5
		OR			
Q.10	a.	Explain the following file-access methods i) Sequential access ii) Direct access.	10	L2	CO5
	b.	Describe the following schemes for defining the logical structure of a directory. i) Single-level directory ii) Two-level directory iii) Tree-structured directory.	10	L2	CO5

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