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63/1(SEM-5)CC12/BCAHC5126

2024

COMPUTER APPLICATION

Paper : BCAHC5126

(Operating System)

Full Marks : 60

Pass Marks : 24

Time : 3 hours

***The figures in the margin indicate
full marks for the questions.***

I. Multiple choice type questions: **(any five)**
1×5=5

1. What is the waiting state of a process in CPU scheduling?
 - A. process is scheduled to run.
 - B. process is unable to run until some task has been completed.
 - C. process is using the CPU.

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Contd.

D. process is in the ready queue.

2. In a time-sharing operating system, when the time slot given to a process is completed, the process goes from the running state to the_____

- A. Blocked state.
- B. Waiting state.
- C. Ready state.
- D. Terminated state.

3. Several processes access and manipulate the same data concurrently and the outcome of the execution depends on the particular order in which the accesses takes place, is called a(n) _____

- A. Shared Memory Segments.
- B. Entry Section.
- C. Race condition.
- D. Process Synchronization.

4. If a process is executing in its critical section, then no other processes can be executing in their critical section. This condition is called_____

- A. Critical exclusion
- B. Synchronous exclusion
- C. Asynchronous exclusion.
- D. Mutual exclusion.

5. _____is the measure of processes that are completed per time unit.

- A. Throughput.
- B. CPU utilization.
- C. Turnaround time.
- D. Response time.

6. Which component of the operating system is responsible for memory management?

- A. File Manager
- B. User Interface
- C. Device Manager
- D. Kernel

7. Deadlock in an operating system occurs when:

- A. Multiple processes are using the same memory space.

B. Two or more processes are blocked, waiting for each other to release resources

C. The system runs out of available memory

D. A process takes too much CPU time

8. Which of the following memory management techniques allows processes to be allocated non-contiguous memory segments?

A. Paging

B. Swapping

C. Contiguous memory allocation

D. Fixed partitioning

9. In a Round Robin (RR) scheduling algorithm, what parameter defines the amount of time each process gets to run?

A. Time slice or quantum

B. Process priority

C. Wait time

D. Burst time

10. Virtual memory is a concept that allows:

A. The execution of programs stored only on secondary storage

B. Faster access to frequently used files

C. The use of a computer's hard disk as additional RAM

D. The allocation of dedicated memory to each process

II. Answer the following questions : **(any five)**
 $2 \times 5 = 10$

1. Define turnaround time in CPU scheduling.

2. What is critical section problem?

3. Explain semaphores?

4. Mention the necessary conditions for which deadlock can arise.

5. Define multitasking in the context of operating systems.

6. What is a process in an operating system?

7. Explain the term "context switch."

III. Answer the following questions : **(any five)**
5×5=25

1. What is deadlock prevention, how can deadlock be prevented? 1+4=5
2. Describe Resource Allocation Graph Algorithm used for Deadlock Avoidance. 5
3. Describe recovery from deadlock using process termination and resource pre-emption. 5
4. How can a deadlock be detected when there is only one instance of each resource type, explain? 5
5. Explain paging and its basic methods. 5
6. Explain the difference between a file and a directory in file management. 5
7. Explain Fragmentation and its solution. 5
8. Explain the file operations reading a file and writing a file. 5
9. Write the Safety algorithm and Resource-Request algorithm of the Banker's Algorithm in details.

IV. Answer the following question: **(any two)**
10×2=20

1. Consider the following set of processes, with their arrival time and length of the CPU burst given in milliseconds:
3+3+3+1=10

Processes	CPU Burst Time	Arrival Time
P ₁	6	0
P ₂	4	1
P ₃	2	2
P ₄	3	3

Draw three Gantt charts each for FCFS, Shortest Job First (preemptive) and Round Robin (time quantum=4ms) scheduling algorithms to illustrate the execution of these processes then fine out:

- i. The waiting time for each of the processes for each of the algorithms.
- ii. The turnaround time for each of the processes for each of the algorithms.

iii. The average waiting and turnaround time.

2. Consider the following snapshot of a system: 10

	ALLOCATION			MAX			AVAILABLE		
	X	Y	Z	X	Y	Z	X	Y	Z
P ₀	0	1	0	7	5	3	3	3	2
P ₁	2	0	0	3	2	2			
P ₂	3	0	2	9	0	2			
P ₃	2	1	1	2	2	2			
P ₄	0	0	2	4	3	3			

Where, P₀, P₁, P₂, P₃, P₄ are processes and X,Y,Z are different resource types, such that there are 10 instances of resources type X, 5 instances of resources type Y and 7 instances of resource type Z.

Find the content of the matrix Need, check whether the system is in safe state or not and if it is safe then find the safe sequence by running the safety algorithm of Banker's algorithm.

3. What is linked list allocation? Write the advantages and disadvantages of linked list allocation.

4. What is demand paging? Apply FIFO, Optimal and Least Recently Used page replacement algorithms to the following reference string (pages) to find out how many number of page faults occur of the algorithms, considering 3 page frames: 1+9=10

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