

MASTER OF COMPUTER APPLICATION
Third Semester
OPERATING SYSTEM
(MCA – 13)

Duration: 3Hrs.

Full Marks: 70

Part-A (Objective) =20
Part-B (Descriptive) =50

(PART-B: Descriptive)

Duration: 2 hrs. 40 mins.

Marks: 50

Answer any five of the following questions:

1. What is a race condition? Explain how a critical section avoids this condition.
What are the properties which a data item should possess to implement a critical section? (2+3+5=10)
2. Consider the following system snapshot using data structures in the Banker's algorithm, with resources A, B, C, and D, and process P0 to P4:

	Max				Allocation				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	6	0	1	2	4	0	0	1	3	2	1	1
P1	1	7	5	0	1	1	0	0				
P2	2	3	5	6	1	2	5	4				
P3	1	6	5	3	0	6	3	3				
P4	1	6	5	6	0	2	1	2				

Using Banker's algorithm, answer the following questions.

- (a) How many resources of type A, B, C, and D are there? (1)
- (b) What are the contents of the Need matrix? (2)
- (c) Find the safe state. (3)
- (d) If a request from process P4 arrives for additional resources of (1,2,0,0,), can the Banker's algorithm grant the request immediately? Show the new system state and other criteria. (4)

3. Define the following: (2×5=10)

- (i) Process; (ii) Process Control Block (PCB)
(iii) Multi programming (iv) Time sharing
(v) Resource allocation graph

4. What is a deadlock? What are the necessary conditions for deadlock? What are the methods to handle deadlock, explain any one. (2+3+5=10)

5. What is stub? What is virtual memory? List down three benefits of virtual memory. Explain how virtual memory is implemented. (1+1+3+5=10)

6. What is a thread? How is a thread different from a process? Discuss the benefits of using multithreading. Explain the process states with figure. (1+3+3+3=10)

7. Mention the scheduling criteria of a short term scheduler. Which scheduling algorithm suffers from starvation and what is the solution to it? Consider the following set of processes, with length of CPU burst given in milliseconds, (2+2+6=10)

Process	Burst time	Priority
P1	10	4
P2	2	3
P3	1	1
P4	2	2
P5	5	4

Find the average waiting time and turnaround time for

- I. FCFS II. SJF III. Priority scheduling

8. What is a file? What are the common attributes of a file? Explain the general operations that can be performed on a file. Apply the FCFS, SSTF disk scheduling algorithms to find total distance that a disk arm moves to satisfy the following pending request in FIFO order assuming that the drive is currently serving a request at cylinder 143. (1+2+3+4=10)

86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130.

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Duration: 20 minutes

Marks – 20

(PART A - Objective Type)

I. Answer the following:

1×20=20

1. A program in execution is called _____.
2. Interval between the time of submission and completion of the job is called
 - a. Waiting time
 - b. Turnaround time
 - c. Throughput
 - d. Response time
3. A scheduler which selects processes from secondary storage device is called
 - a. Short term scheduler
 - b. Long term scheduler
 - c. Medium term scheduler
 - d. Process scheduler
4. The scheduling in which CPU is allocated to the process with least CPU_burst is called
 - a. Priority scheduling
 - b. Shortest job first scheduling
 - c. Round Robin scheduling
 - d. Multilevel queue scheduling
5. The term page traffic describes the movement of pages in and out of memory. (true/false)
6. Which of the following is not a fundamental process state?
 - a. Ready
 - b. Executing
 - c. Terminated
 - d. Blocked
7. Which of the following approaches do not require knowledge of the system state?
 - a. Deadlock detection
 - b. Deadlock prevention
 - c. Deadlock avoidance
 - d. None of the above
8. _____ loader is executed when a system is first turned on or restarted.
9. Poor response time is usually caused by
 - a. Process busy
 - b. High I/O rates
 - c. High paging rates
 - d. Any of the above

10. "Throughput" of a system is
- Number of programs processed by it per unit time.
 - Number of times the program is invoked by the system.
 - Number of requests made to a program by the system.
 - None of the above.
11. Which scheduling policy is most suitable for a time-shared operating system?
- SJF
 - FCFS
 - Round Robin
 - SRJF
12. A critical section is a program segment
- which should run in a certain specified amount of time.
 - which avoids deadlocks.
 - where shared resources are accessed.
 - which must be enclosed by a pair of semaphore operations, P and V.
13. Which amongst the following is not a valid page replacement policy?
- LRU
 - RU
 - FIFO
 - Optimal page replacement
14. A set of techniques that allow to execute a program which is not entirely in memory is called
- Secondary memory
 - Virtual memory
 - Main memory
 - None of the above
15. _____ page replacement algorithm suffers from Belady's anomaly.
16. To avoid race condition, the maximum number of processes that may be simultaneously inside the critical section is
- Two
 - One
 - Three
 - Zero
17. The memory allocation scheme subject to "external" fragmentation is
- Demand paging
 - Segmentation
 - Swapping
 - None of the above
18. _____ is a technique of temporarily removing inactive programs from the memory of computer system.
- Swapping
 - Spooling
 - Semaphore
 - Scheduling
19. Which of the following is a technique of improving the priority of processes waiting in Queue for CPU allocation?
- Starvation
 - Ageing
 - Relocation
 - None of the above
20. Before proceeding with its execution, each process must acquire all the resources it needs is called
- Hold and wait
 - No preemption
 - Circular wait
 - Starvation
