



BRAINWARE UNIVERSITY

Programme – Master of Computer Applications

Course Name - Operating System

Course Code - MCA301 / MCA301 (BL)

(Semester – 3)

Time allotted: 3 Hours

Full Marks : 70

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group –A

(Multiple Choice Type Question)

10 x 1 = 10

1. *Choose the correct alternative from the following*

(i) Which of following is not a condition of DeadLock ?

- | | |
|---------------------|------------------|
| a. Mutual Exclusion | b. No Preemption |
| c. Hold and Wait | d. Data Transfer |

(ii) To avoid the race condition, the number of processes that may be simultaneously inside their critical section is

- | | |
|-------|------|
| a. 8 | b. 1 |
| c. 16 | d. 0 |

(iii) A thread is _____

- | | |
|---|--|
| a. lightweight process where the context switching is low | b. lightweight process where the context switching is high |
| c. used to speed up paging | d. used in deadlocks |

- (iv) Operating System provides the different types of services to the user. For accessing these services, the interface is provided by the
- a. System calls
 - b. Application Programming Interface.
 - c. Native library.
 - d. None of the above.
- (v) Which is single user operating system?
- a. MS-DOS
 - b. UNIX
 - c. XENIX
 - d. LINUX
- (vi) In which of the storage placement strategies a program is placed in the largest available hole in the main memory?
- a. best fit
 - b. first fit
 - c. worst fit
 - d. buddy
- (vii) Virtual memory is
- a. An extremely large main memory
 - b. An extremely large secondary memory
 - c. An illusion of extremely large main memory
 - d. A type of memory used supercomputer
- (viii) What is the name of the operating system that reads and reacts in terms of actual time.
- a. Batch system
 - b. Quick response system
 - c. Real time system
 - d. Time sharing system
- (ix) The FIFO algorithm
- a. executes first the job that last entered the queue
 - b. executes first the job that first entered the queue
 - c. executes first the job with the least processor needs
 - d. None of the above

- (x) Banker's algorithm for resource allocation deals with
- a. deadlock prevention
 - b. deadlock avoidance
 - c. deadlock recovery
 - d. mutual exclusion

Group – B

(Short Answer Type Questions)

3 x 5 = 15

Answer any *three* from the following

2. Calculate the number of page faults for the following reference string using LRU algorithm with frame size as 4.
5,0,2,1,0,3,0,2,4,3,0,3,2,1,3,0,1,5. 5
3. Discuss different thread modeling. 5
4. Consider the following scenario of processes with time quantum = 4.
Draw the gantt chart for the execution of the processes, showing their start time and end time using RR scheduling strategy. Calculate turnaround time and average waiting time for the system.

Process	Arrival Time	Execution Time
P1	0	18
P2	1	3
P3	2	4
P4	3	5
P5	4	3

5

5. Discuss different types of file access methods. 5
6. Discuss scheduling criteria in details. 5

Group – C

(Long Answer Type Questions)

3 x 15 = 45

Answer any *three* from the following

7. (a) What is Semaphore? Differentiate between binary and counting semaphore. 1+4
- (b) Define progress for process synchronization. 2
- (c) What do you mean by starvation and aging? 3
- (d) What do you mean by IPC. Explain briefly. 5
8. (a) Define and explain seek time and Disk access time. 3
- (b) Consider a disk queue with I/O request on the following cylinder in their arriving order: 37,56,98,32,108,78,44,67,69,100. The disk head is assumed to be at cylinder 40 and moving in the direction of decreasing number of cylinders. The disk consists of total 150 cylinders. Calculate and show the total head movement using FCFS and SSTF scheduling algorithm. 12
9. (a) Given memory partitions of 100K,500K, 200K, 300K and 600K (in order). How would each of the 1st 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? 9
- (b) What do you mean by page fault? What is lazy swapper? 2+2
- (c) Explain belady's anomaly. 2
10. Answer the following questions using the Banker's Algorithm.
- | Processes | Allocation | | | | Max | | | |
|-----------|------------|---|---|---|-----|---|---|---|
| | A | B | C | D | A | B | C | D |
| P0 | 2 | 0 | 0 | 1 | 4 | 2 | 1 | 2 |
| P1 | 3 | 1 | 2 | 1 | 4 | 2 | 5 | 2 |
| P2 | 2 | 1 | 0 | 3 | 2 | 3 | 1 | 6 |
| P3 | 1 | 3 | 1 | 2 | 1 | 4 | 2 | 4 |
| P4 | 1 | 4 | 3 | 2 | 3 | 6 | 6 | 5 |
- (a) Illustrate the system is in safe state with mentioning the order of execution of the processes. 10
- (b) If P1 requests (1, 1, 0, 0) can the request be granted immediately? 5

11. Write short notes on any *three* of the following. 3x5

- (a) File Allocation Method
- (b) PCB
- (c) Virtual Memory
- (d) Race Condition
- (e) Producer-Consumer Problem
