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BRAINWARE UNIVERSITY

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Term End Examination 2025-2026

Programme – BCA(MAWT)-Hons-2024/BCA(MAWT)-Hons-2025

Course Name – Operating System

Course Code - BMT20202

(Semester II)

Full Marks : 60

Time : 2:30 Hours

[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)

1 x 15=15

1. Choose the correct alternative from the following :

- (i) What was the main purpose of early operating systems?
 - a) To manage hardware
 - b) To provide a user interface
 - c) To manage files
 - d) To manage memory
- (ii) What is the purpose of a user interface in an operating system?
 - a) To provide a way for users to interact with the computer
 - b) To manage memory
 - c) To manage files
 - d) To manage hardware
- (iii) Which of the following best defines a distributed system?
 - a) A system where all resources are located on a single machine
 - b) A collection of independent computers that appear as a single system to users
 - c) A system that runs only on cloud-based infrastructure
 - d) A single-user operating system designed for personal computers
- (iv) Identify the scheduling algorithm that uses a circular queue for process execution:
 - a) Shortest Job First
 - b) Round Robin
 - c) Priority Scheduling
 - d) First-Come, First-Served
- (v) Select the state transition that occurs when a process finishes I/O and is ready to resume execution:
 - a) Blocked to Ready
 - b) Ready to Running
 - c) Running to Blocked
 - d) Ready to Terminated
- (vi) Select the data structure commonly used in most operating systems to keep track of a process's execution state.
 - a) Process Control Block (PCB)
 - b) Semaphore
 - c) Resource Allocation Graph
 - d) Interrupt Service Routine
- (vii) Choose the page replacement algorithm that may result in Belady's anomaly.
 - a) FIFO (First-In-First-Out)
 - b) LRU (Least Recently Used)
 - c) Optimal Page Replacement
 - d) Clock Algorithm

- (viii) Choose the key feature of the Multilevel Feedback Queue scheduling algorithm.
- Adjusts priority of processes based on their behavior
 - Executes processes based on arrival time
 - Assigns fixed priority levels to processes
 - Uses only one queue for all processes
- (ix) Choose the example of a distributed file system.
- NTFS
 - Google File System (GFS)
 - FAT32
 - EXT4
- (x) Select the method by which the Optimal Page Replacement algorithm operates.
- It replaces the page that will not be used for the longest period in the future
 - It replaces the least recently used page
 - It replaces the page with the smallest size
 - It replaces the page that was loaded first
- (xi) Discover the method used for preventing deadlocks.
- Avoiding circular wait
 - Using multiple CPUs
 - Increasing memory size
 - Improving I/O speed
- (xii) State the strategy that represents non-contiguous memory allocation.
- Paging
 - Best fit
 - First fit
 - Worst fit
- (xiii) Apply the Bankers Algorithm to prevent deadlock.
- By allocating resources dynamically
 - By checking if resource allocation will lead to a safe state
 - By killing processes in deadlock
 - By swapping processes to disk
- (xiv) Choose the function of a page table in virtual memory.
- To map virtual addresses to physical addresses
 - To allocate memory to processes
 - To determine which page to replace
 - To manage I/O operations
- (xv) Select the techniques that reduce thrashing in a virtual memory system.
- Increasing page size
 - Reducing the degree of multiprogramming
 - Decreasing CPU clock speed
 - Implementing preemptive scheduling

Group-B

(Short Answer Type Questions)

3 x 5=15

- List the difference between internal and external fragmentation and mention the conditions for each type of fragmentation to occur. (3)
- Infer how the concept of ageing addresses the problem of process starvation in Priority Scheduling. (3)
- Illustrate the concept of Belady's anomaly. (3)

- Given the following processes and a time quantum of 3 ms, use the Round Robin scheduling algorithm to calculate the turnaround time for P3.: (3)

	Process Arrival Time (ms)	Burst Time (ms)
P1	0	10
P2	1	4
P3	2	6
P4	3	9

6. Explain Round-Robin and Priority Scheduling algorithm with examples. (3)

OR

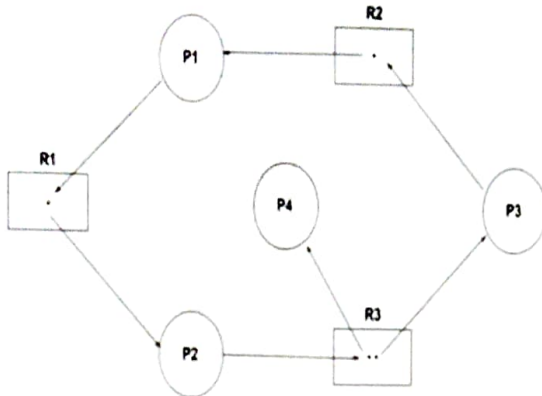
- Explain the differences between client-server architecture and peer-to-peer architecture. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Based on the following Resource allocation graph, explain whether a deadlock will occur or (5)
not. If no deadlock occurs, what are the possible process sequences?



8. Given references to the following pages by a program, 0, 9, 0, 1, 8, 1, 8, 7, 8, 7, 1, 2, 8, 2, 7. (5)
Show how many page faults will occur if the program has three (3) page frames available to it and uses both FIFO replacement strategy and LRU replacement strategy.
9. A computer system uses paging as its memory management scheme. The logical address space consists of 8 pages, each containing 1024 words, and the physical memory consists of 32 frames. Using your understanding of paging and binary addressing, explain why page sizes are always chosen as powers of 2, and apply this concept to determine the number of bits required for both the logical address and the physical address, clearly showing how the bits are divided between page/frame number and offset. (5)
10. Given memory partition of 100K, 500K, 200K, 300K and 600K (in order). Plan and solve how (5)
would each of the first fit, best fit and worst fit algorithm place process of 212K, 417K, 112K and 426K (in order)? Test that, which algorithm makes the most efficient use of memory.
11. Compare the architectures of single-tasking and multitasking operating systems. (5)
12. A multiprogramming system can hold 4 processes in memory. Draw a simple figure (5)
showing how multiprogramming organizes processes in memory, and write how it improves CPU utilization.

OR

Solve the problem using Banker's Algorithm. (5)

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
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			

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