



BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – BCA-Hons-2024

Course Name – Operating System

Course Code - BCA40110

(Semester IV)

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) Which component acts as the intermediary between the computer hardware and the computer user?
 - a) System Call
 - b) Compiler
 - c) Operating System
 - d) Assembler
- (ii) Select the operating system type designed to process jobs in groups without user interaction.
 - a) Batch System
 - b) Time-Sharing System
 - c) Real-Time System
 - d) Distributed System
- (iii) Which is the central module of an operating system responsible for process and memory management?
 - a) Shell
 - b) Kernel
 - c) GUI
 - d) Compiler
- (iv) Which interface relies strictly on text-based input to interact with the operating system?
 - a) Graphical User Interface
 - b) Batch Interface
 - c) Command Line Interface
 - d) Touch Interface
- (v) What defines the set of services provided by the operating system to the user?
 - a) System Calls
 - b) Hardware
 - c) Bus
 - d) Registers
- (vi) Choose from the following options: If the system can satisfy the needs of P1, then P3, then P2 using the concept of "Safe Sequence", what is the state of the system?
 - a) Unsafe
 - b) Deadlocked
 - c) Safe
 - d) Starved
- (vii) Determine the value of a counting semaphore from the following options if it is initialized to 10 and undergoes 3 wait() operations and 2 signal() operations.

Apply non-preemptive SJF scheduling for the following processes and find the average waiting time and average turnaround time.

Process	Arrival Time (ms)	Burst Time (ms)
P1	0	7
P2	2	4
P3	4	1
P4	5	4

Library
Brainware University
398, Ramkrishnapur Road, Barasat
Kolkata, West Bengal-700125

6. A disk with 150 cylinders has requests: 25, 75, 50, 100, 125, 10. The head starts at 60 and moves upwards. Analyze the performance improvement between the head movements calculated using C-LOOK and LOOK algorithms. (3)

OR

- A disk drive has 200 cylinders (0-199) and a request queue: 82, 170, 43, 140, 24, 16, 190. The disk head starts at cylinder 50, moving toward higher cylinders. Compare the performance of SSTF algorithms in terms of total head movement. (3)

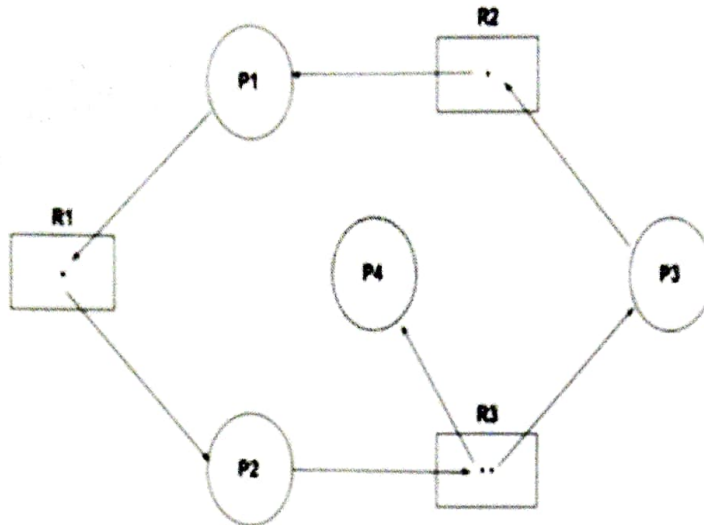
Group-C

(Long Answer Type Questions)

5 x 6=30

- Determine, using the Banker's Algorithm, whether a safe sequence exists for a system with 3 processes (P0, P1, P2) and 3 resource types (A, B, C) given the following data: available resources are A = 5, B = 3, C = 2. The maximum demand and current allocation for each process are: P0 Max = (7, 5, 3), Allocation = (2, 1, 1); P1 Max = (3, 2, 2), Allocation = (2, 1, 1); P2 Max = (9, 0, 2), Allocation = (3, 0, 2). (5)
- Solve the problem: Consider a logical address space of eight pages of 1024 words each, mapped onto a physical memory of 32 frames. Evaluate: i) How many bits are there in the logical address? ii) How many bits are there in the physical address? (5)
- Solve the memory allocation problem for the given memory partitions of 100K, 500K, 200K, 300K, and 600K (in order). Allocate processes of size 212K, 417K, 112K, and 426K (in order) using First Fit, Best Fit, and Worst Fit algorithms. Identify which algorithm uses memory most efficiently. (5)
- Compare the architectures of single-tasking and multitasking operating systems. (5)

11. Explain whether a deadlock will occur or not based on the given Resource Allocation Graph (RAG) and, if no deadlock occurs, determine the possible process sequences. (5)



12. Evaluate the number of page faults for the given page reference string: 0, 9, 0, 1, 8, 1, 8, 7, 8, 7, 1, 2, 8, 2, 7, if the program has three (3) page frames and uses both FIFO and LRU page replacement strategies. (5)

OR

Evaluate the size of the page table for a system with byte-addressable memory, 32-bit logical addresses, 4 KB page size, and 4-byte page table entries. (5)

Library
Brainware University
398, Ramkrishnapur Road, Barasat
Kolkata, West Bengal-700125