 **KIST COLLEGE OF MANAGEMENT**

**Full Marks: 60**

**Pass Marks: 36**

**Time: 3 hrs.**

**Affiliated to Tribhuvan University**

**Kamalpokhari, Kathmandu**

**September, 2024**

**Pre - Board Examination**

**BIM / Fourth Semester / IT 241: Operating System**

*Candidates are required to answer the question in their own words as far as practicable.*

**Group – A**

**Brief Answer Questions: [10 x 1 = 10]**

1. What to do you mean by system call?
2. Define time sharing.
3. Sketch the diagram for hierarchical directory system.
4. What is the race condition in concurrent programming?
5. Define resource allocation graph.
6. What is variable partitions strategy in memory allocation?
7. Explain the term paging in virtual memory.
8. What is the purpose of a file system in an operating system?
9. Why is operating system security needed?
10. What is bitmap?

**Group – B**

**Short Answer Questions [Attempt any Five Questions]: [5 x 3 = 15]**

1. Given memory partitions of 10 k, 4 k, 20 k, 18 k, 7 k, 9 k, 12 k, and 15 k (in order). How would each of first-fit, best fit and worst fit algorithms place processes of 12 k, 10 k and 9 k (in order)? Which algorithms make the best use of memory?
2. Compare Windows, Linux, and Mobile operating system.
3. Describe the advantages of a distributed operating system over a centralized operating system?
4. Explain the difference between logical and physical addressing in the context of memory management.
5. Describe the Linked List Allocation method in detail.
6. What are the various methods of authentication in security systems? Explain.

**Group – C**

**Long Answer Questions [Attempt any Three Questions]: [3 x 5 = 15]**

1. Five batch jobs A through E, arrive at a computer center at almost same time (suppose arrival time for all process be 1). They have estimated running times of 10, 8, 4, 2, and 6. Their priorities are 3, 5, 2, 4 and 1 respectively with 5 being the highest priority. For each of the scheduling algorithms determine the **average turnaround time and waiting time**.
   1. Round Robin (Quantum=2)
   2. Priority Scheduling
2. How is semaphore used for the process synchronization? Do you think semaphore is the best solution for solving critical section problems? Explain using it in Producer-consumer problem.
3. A disk queue has the following request to read tracks: 87, 170, 4, 57, 173, 32, 67 and 183. If the disk head is initially at cylinder 90 and there is total 200 tracks, then calculate total head movement using C-SCAN and C-LOOK algorithm.
4. What do you mean by Deadlocks? Explain the necessary conditions for deadlocks. Given references to the following pages by a program, 0, 9, 0, 1, 8, 1, 8, 7, 8, 7, 1, 2, 8, 2, 7, 8, 2, 3, 8, 3. How many page faults will occur if the program has three-page frames for each of the following algorithms?
   1. WS-CLOCK
   2. LFU

**Group – D**

**Comprehensive Answer Questions: [2 x 10 = 20]**

1. What are the conditions for deadlock? Explain. Consider the following four resources A, B, C and D with five processes and answer the questions:

Allocation Max Available

A B C D A B C D A B C D

P1 0 0 1 2 0 0 1 2 1 5 2 0

P2 1 0 0 0 1 7 5 0

P3 1 3 5 4 2 3 5 6

P4 0 6 3 2 0 6 5 2

P5 0 0 1 4 0 6 5 6

a. Compute need matrix of corresponding data.

b. Is the system in a safe state? Use Banker algorithm. If yes give the sequence.

1. What is the file system layout? Compare and contrast contiguous allocation and linked list allocation and linked list allocation using table in memory allocation techniques. Explain the advantages and disadvantages of each approach.

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