**NAGARJUNA COLLEGE OF INFORMATION TECHNOLOGY**

**Full Marks: 60**

**Pass Marks: 30**

**Time: 3 hrs.**

**Shankhamul -09, Lalitpur**

**SET - A**

**Pre-Board Examination -2081**

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

***Candidates are required to give their answers in their own words.***

**Group A**

**Brief answer questions:**

**Attempt all questions. (10 × 1=10)**

1. What is the fundamental role of an operating system in a computer system?
2. Define system calls and shell in os.
3. What is program, thread and process?
4. What is IPC in process management?
5. What is (FCFS) scheduling algorithm?
6. What is resource allocation graph?
7. What is the purpose of use of bitmaps and linked-lists for MM?
8. What device connects I/O devices to the CPU and manages data transfer?
9. What is a common security problem in operating systems?
10. How does the Linux file system structure compare to Windows?

**Group B**

**Short Answers Questions**

**Attempt any *five* questions. (5 × 3= 15)**

1. How do monolithic and microkernel differ from each other?
2. Describe the Banker's Algorithm for deadlock avoidance.
3. Compare and contrast fixed-partition and variable-partition memory allocation strategies.
4. **Differentiate between single-level and two directory systems, explaining how they organize files and directories.**
5. Discuss different I/O techniques: programmed I/O, interrupt-driven I/O.
6. Explain the difference between authentication and authorization in the context of operating system security.

**Group C**

**Long Answer Questions**

**Attempt any *three* questions. (3× 5= 15)**

1. Define the concept of lock variables. Describe the strict alteration algorithm for implementing mutual exclusion in multi-threaded environments.
2. Describe algorithms for detecting deadlocks in systems with single and multiple resource instances
3. Briefly explain why use to control access to resources in an operating system.
4. Consider a page reference string: 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5. Apply the FIFO, Second Chance page replacement algorithms with a frame size of 3.

**Group D**

**Comprehensive Questions**

**Attempt all question. (2 × 10 = 20)**

1. Define the term seek time and rotational delay in disk scheduling. Suppose that the disk has 100 cylinders, numbered 0 to 99. The drive is currently serving a request at cylinder 53 and previous request was at cylinder 43. The queue of pending request, in FIFO order is: 98, 183, 37, 122, 14, 124, 65, 67. Starting from current head position, what is total distance (in cylinders) that the disk arm moves to satisfy all pending request for each of following disk scheduling algorithms?

a) FCFS b) SSTF c) SCAN d) LOOK

* 1. Define Translation Lookaside Buffer (TLB) and explain its role in virtual memory systems. Describe common directory operations such as create, delete, rename.

***The End***

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**SET - B**

**Pre-Board Examination -2081**

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

***Candidates are required to give their answers in their own words.***

**Group A**

**Brief answer questions:**

**Attempt all questions. (10 × 1=10)**

1. Define the kernel of an operating system.
2. What is multiprogramming, and how does it enhance the utilization of CPU?
3. Define race condition and explain how it can occur in concurrent computing environments.
4. What is the difference between logical and physical memory addresses?
5. Explain the two necessary conditions for a deadlock to occur in a system.
6. **What is the main disadvantage of using bitmaps for free space management?**
7. What is the main purpose of I/O software?
8. What is the basic role of a DMA controller in enhancing I/O performance?
9. What is the term for unauthorized access to a computer system or its resources?
10. How does mobile multitasking differ between Android and iOS?

**Group B**

**Short Answers Questions**

**Attempt any *five* questions. (5 × 3= 15)**

1. Differentiate between user-level and kernel-level threads.
2. How does strict alternation ensure fairness in granting access to the critical section?
3. Describe the Banker's Algorithm for deadlock avoidance.
4. Describe the paging mechanism used in virtual memory systems for address translation.
5. **Explain two methods used for file allocation (contiguous allocation and linked list allocation) and highlight their key differences.**
6. Define a distributed operating system and explain its fundamental characteristics.

**Group C**

**Long Answer Questions**

**Attempt any three questions. (3× 5= 15)**

1. Explain the concept of "safe state" in deadlock detection. Describe two methods for recovering from a deadlock situation.
2. Differentiate I/O management system with memory mapped I/O and programed I/O.
3. Consider following process data and compute average waiting time and average turnaround time for RR(quantum 10) and priority scheduling algorithms.

PID Burst Time Arrival Time Priority

A 16 0 1

B 37 12 2

C 25 7 3

1. Compare the app distribution processes between Android and iOS.

**Group D**

**Comprehensive Questions**

**Attempt all question. (2 × 10 = 20)**

1. Consider the following snapshot of a system.

Process\_no Allocation Max Available

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

P0 1 0 1 2 2 1 2 3 1 2 1 1

P1 0 1 2 1 1 2 3 1

P2 1 2 1 0 2 3 2 1

P3 2 1 0 1 3 2 1 2

Answer the following questions using banker's algorithm.

a) What is the content of the matrix need?

b) Is the system in a safe state?

c) If a request from process P1 arrives for (0, 2, 1, 0), can the request be granted immediately?

22) Compare and contrast single-level, two-level, and hierarchical directory systems. Discuss different disk scheduling algorithms, including First-Come, First-Served (FCFS), Shortest Seek Time First (SSTF)

***The End***