Tribhuvan University
Institute of Science and Technology
2081
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Bachelor Level / Second Year/ Forth Semester/ Science
Computer Science and Information Technology (CSC 259)
(Operating Systems)
(OLD COURSE)

Full Marks: 60
Pass Marks: 24
Time: 3 hours.

Candidates are required to give their answers in their own words as for as practicable.
All figures in the margin indicate full marks.

Section A

Long Answer Questions.
Attempt any **TWO** questions. **[2 × 10 = 20]**

1. What is inter-process communication? Consider the following processes with their arrival times and burst times:

Process	Arrival Time	Burst Time
P1	0	4
P2	1	3
P3	2	7
P4	3	2

Calculate the average waiting time and average turnaround time for FCFS and shortest job. [2+8]

2. Discuss the four necessary conditions for a deadlock to occur and explain how each condition contributes to the occurrence of deadlock. Explain how deadlock should be handled. [5+5]

3. What is virtual memory and why is it important in modern operating system. Explain the concept of paging. [5+5]

Section B

Short Answer Questions.
Attempt any **EIGHT** questions. **[8 × 5 = 40]**

4. What is a system call in an operating system? Describe the process of handling system calls and the role of system programs in managing them. [1+4]

5. Define the concept of threads. Compare and contrast threads and processes. [1+4]

6. Explain the concept of a resource allocation graph. How is it used to detect deadlock in a system with multiple resources? [1+4]

7. Explain the DMA operation and how does it improve the system performance. [5]

8. Describe the different file access methods. Compare sequential and direct access methods. [2.5+2.5]

9. Assume the disk has 200 tracks (numbered from 0 to 199). The disk head is initially positioned at 100, and we have a sequence of requests for tracks in the following order: 55, 58, 39, 18, 90, 160, 150, 38 calculate the seek time for the disk scheduling algorithm FCFS and SCAN. [5]

10. Consider the page references 3, 2, 1, 5, 4, 2, 1, 3, 5, 2 find the number of page fault using LRU and optimal page replacement algorithm with page frames? [5]

11. What are the merits and demerits of contiguous file allocation? How it differs from linked list allocation. [2.5+2.5]

12. Write short notes on: [2x2.5=5]
    a. Kernel modules in Linux.
    b. Semaphore.