**Tribhuvan University**

**Institute of Science and Technology**

**2079**

Bachelor Level / fourth-semester / Science
Computer Science and Information Technology( CSC259 )
Operating System

Full Marks: 60 + 20 + 20
Pass Marks: 24 + 8 + 8
Time: 3 Hours

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



## Section A

### Long Answer Question

1 Discuss about single level and two level directory system. Consider the following process and answer the following questions.

| Process | Allocation | Max | Available |
|---|---|---|---|
| | A B C D | A B C D | A B C D |
| P0 | 0 0 1 2 | 0 0 1 2 | 1 5 2 0 |
| P1 | 1 0 0 0 | 1 7 5 0 | |
| P2 | 1 3 5 4 | 2 3 5 6 | |
| P3 | 0 6 3 2 | 0 6 5 2 | |
| P4 | 0 0 1 4 | 0 6 5 6 | |

a. What is the content of matrix Need?

b. Is the system in safe state?

c. If P1 request (0,4,2,0) can the request be granted immediately.

---

When does race condition occur in inter process communication? What does busy

waiting mean and how it can be handled using sleep and wakeup strategy?

3 Define shell and system call. suppose a disk has 201 cylinders, numbered from 0 to 200. At same time the disk arm is at cylinder 95, and there is a queue of disk access requests for cylinders 82,170,43,140,24,16 and 190. Calculate the seek time for the disk scheduling algorithm FCFS,SSTF,SCAN and C-SCAN.

## Section B

### Short Answer Questions

4 Distinguish between starvation and deadlock . How does the system schedule process using multiple queues?

5 List any two demerits of disabling interrupt to achieve mutual exclusion. Describe about fixed and variable partitioning

6 For the following dataset, compute average waiting time for SRTN and SJF.

| Process | Arrival Time | Burst Time |
|---|---|---|
| P0 | 0 | 7 |
| P1 | 2 | 4 |
| P2 | 4 | 1 |
| P3 | 5 | 4 |

7 Discuss the advantages disadvantages of implementing file system using Linked List.

8 Consider the page references 7,0,1,2,0,3,0,4,2,3,0,3,2, Find the number of page fault using OPR and FIFO, with 4 page frame.

9 Describe the working mechanism of DMA.

10 What is the task of disk controller ? List some drawback of segmentation.

11 Write the structure and advantages of TLB.

12 Why do we need the concept of locality of reference ? List the advantages and disadvantages of Round Robin algorithm.

**Tribhuvan University**

**Institute of Science and Technology**

**2078**

Bachelor Level / fourth-semester / Science
Computer Science and Information Technology( CSC259 )
Operating System

Full Marks: 60 + 20 + 20
Pass Marks: 24 + 8 + 8
Time: 3 Hours

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



## Long Answer Questions

**Attempts any two Questions (2 x 10 = 20)**

1 What kind of problem arises with sleep and wakeup mechanism of achieving mutual exclusion? Explain with suitable code snippet.

2 Why OPR is best but not pratically fessible page replacement algorithm? Calculate the number of page faults for OPR, LRU and Clock page replacement algorithm for the reference string: 1, 3, 4, 2, 3, 5, 4, 3, 1, 2, 4, 6, 3, 2, 1, 4, 2. Assume the memory size is 3.

3 How unsafe state differs from deadlocked state? Consider follows initial state and identify wheather requested is and granted or denies for the given cases.

| Process | Has | Max |
|---|---|---|
| A | 2 | 6 |
| B | 1 | 5 |
| C | 2 | 3 |
| D | 3 | 8 |

*Free = 2*

What will happen if process D request 1 resource?

- What will happen if process A request 1 resource?

## Short Answer Questions

**Attempts any eight questions (8 x 5 = 40)**

4 What is system call? Discuss process of handling system calls briefly.

5 What is lock variable? Discuss its working and problems associated with it in detail.

6 Differentiate between internal and external fragmentation? Suppose that we have memory of 100 KB with 5 partitions of size 150 KB, 200 KB, 250 KB, 100 KB, and 300 KB. Where the processes A and B of size 175 KB and 125 KB will be loaded, if we used Best-Fit, and Worst-Fit Strategy?

7 What is ment by file attributes? Discuss any one technique of implementing directories in detail.

8 Why the concept of disk interleaving is important? Explain with suitable example.

9 What is resource allocation graph? Explain the process of detecting deadlocks when there is single instance of each resources with suitable example?

10 Discuss the concept of SJF and SRTN scheduling algorithms with suitable example.

11 What approaches are using for managing free disk spaces? Explain linked list approaches with example.

Write short notes on:

12 a. IPC in Linux

b. Disk access

**Tribhuvan University**

**Institute of Science and Technology**

**2076**

Bachelor Level / fourth-semester / Science
Computer Science and Information Technology( CSC259 )
Operating System

Full Marks: 60 + 20 + 20
Pass Marks: 24 + 8 + 8
Time: 3 Hours

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



## Section A

**Attempt any two questions: (2x10=20)**

1 Defined interactive system goals? List various interactive scheduling algorithms. 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 |

2 How Second Chance page replacement algorithm differs from FIFO page replacement policy? Discuss the concept of Belady's anomaly with suitable example.

3 What is the main objective of disk scheduling algorithms? why SSTF is not practically feasible? Assume that we have disk with 100 tracks and currently head is at track number 35. What will be the seek time for the algorithms SCAN and LOOK for processing IO requests queue: 52, 67, 27, 11, 43, 85, 18, 75, 92, 8?

## Section B

**Attempt any eight questions: (8x5=20)**

4 What are two modes of OS? Discuss different OS structures briefly.

5 When threads are better than processes? Explain the concept of user level threads in detail.

6 Differentiate between multi programming and Monoprogramming. What will be the CPU utilization with 6 processes with 60% IO waiting time are in memory?

7 How can you manage free disk space? Explain the linked list approach of managing free disk space with example.

8 When programmed IO is suitable than other IO handling techniques? Explain the process of IO handling using DMA.

9 Differentiate between deadlock and starvation? Discuss the process of detecting deadlocks when there are multiple resources of each type.

10 What is problem associated with semaphores? Explain the concept of monitors in brief.

11 Why program relocation and protection is important? Explain the technique of achieving program relocation and protection.

Write short notes on:

12 a. Linux File System

b. Resource Allocation Graph