

7425

8

(b) Explain dual mode of operation and its purpose. (5)

(c) Describe design objectives of an operating system from user point of view. (5)

(700)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 7425

J

Unique Paper Code : 2342572401

Name of the Paper : Operating Systems

Name of the Course : **B.A. Prog./B.Sc. (Phy. Sc. & MS)**

Semester : IV

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. **Section A** is compulsory.
3. Attempt any **FOUR** questions from **Section B**.
4. Parts of a question should be attempted together.

P.T.O.

SECTION – A

1. (a) List three advantages of time sharing systems. (3)
- (b) Define system calls and their purpose. (3)
- (c) List different states of a process and under what conditions a process moves to waiting state from running state. (3)
- (d) Explain random access time in the context of disk drives. (3)
- (e) How does operating system prevent unauthorised access of opened files to other processes? (3)
- (f) Differentiate between logical and physical address space. (3)
- (g) Explain the impact of size of the time quantum on waiting time and turnaround time of the Round Robin scheduling algorithm. (3)

6. (a) Given the following page reference string : (5)

4, 3, 5, 6, 4, 2, 1, 3, 6, 2, 4, 1, 5, 7, 8, 6, 4, 3, 2, 1

How many page faults will occur using the LRU (Least Recently Used) page replacement algorithm when there are 4 frames? Assume that all frames are initially empty, meaning each unique page reference will result in a page fault.

- (b) Explain Demand Paging and discuss its advantages and disadvantages. (5)
- (c) Define a critical section problem. List and describe the essential conditions that must be fulfilled to provide a correct solution to it. (5)

7. (a) Given memory partitions of 100 KB, 500 KB, 200 KB, 300 KB and 600 KB (in order). How would the Best Fit algorithm place processes of 212 KB, 417 KB, 112 KB, and 426 KB (in order) in given partitions? (5)

5. (a) Consider a disk queue with requests for I/O to blocks on cylinders as follows : (5)

98, 183, 37, 122, 14, 124, 65, 67

The drive is currently serving a request at cylinder 58. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending request for SSTF (shortest-seek-time-first) scheduling algorithm?

- (b) Define path name. Differentiate between absolute and relative path names using an example. (5)
- (c) "The long-term scheduler should select a balanced mix of I/O-bound and CPU-bound processes". Justify this statement. (5)

- (h) What is Virtual Memory ? How does it differ from physical memory ? (3)
- (i) Explain three goals of an operating system. (3)
- (j) Define compaction and explain its significance in managing fragmentation. (3)

SECTION – B

- 2 (a) The system uses Pre-emptive Priority' Scheduling (lower number = higher priority). Consider the following processes : (10)

Process ID	Arrival Time	Burst Time	Priority
P1	0	10	3
P2	2	5	1
P3	4	2	4
P4	5	3	2

- (i) Draw the Gantt chart showing the execution order.

(ii) Calculate waiting time of each process.

(iii) Calculate turnaround time of each process.

(b) Explain deadlock and the four necessary conditions for deadlock to occur. (5)

3. (a) Explain the use of fork() system call. What will be the output of the following C++ code snippet? Explain your answer. (5)

```
#include <iostream>
#include <unistd.h>
using namespace std;

int main()
{
    cout << "Hello A" << endl;
    fork();
    cout << "Hello B" << endl;
    return 0;
}
```

(b) What is parallelism? How it is achieved in a multithreaded multicore system? (5)

(c) Explain the actions taken by the kernel to context-switch between processes. (5)

4. (a) A logical address space consists of 64 pages, each page containing 1,024 memory slots, and is mapped to a physical memory with 32 frames. (5)

Answer the following :

(i) What is the number of bits required for the logical address?

(ii) What is the number of bits required for the physical address?

(b) Explain the concept of internal fragmentation. Write the techniques used to address this issue. (5)

(c) Define process control block (PCB) and its structure. (5)