

7. Differentiate between the following : (15)

- (i) Multiprogramming and Multiprocessing
- (ii) Job scheduling and CPU scheduling
- (iii) Paging and segmentation
- (iv) Direct and Sequential Access
- (v) Source file and executable file

[This question paper contains 8 printed pages.]

Your Roll No.....

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J

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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.

Section – A

1. (a) List three main functions of an operating system. (3)
- (b) Write three benefits of multithreaded programming. (3)
- (c) Differentiate between orphan process and zombie process. (3)
- (d) What is Virtual memory? How is it different from physical memory? (3)
- (e) A system uses a logical address composed of 8 bits for the page number and 12 bits for the offset. Calculate the total size of the logical address space. (3)
- (f) Name two models for inter process communication. Give any two system calls for the same. (3)

- (c) Given memory partitions of 300 KB, 600 KB, 350 KB, 200 KB and 600 KB (in order). How would the Best Fit and Worst Fit algorithm place processes of 115 KB, 500 KB, 358 KB, and 200 KB (in order). (6)
6. (a) What is a deadlock? What are the conditions which lead to a deadlock? (5)
- (b) Discuss advantages and issues of layered approach of operating system structure. (5)
- (c) 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 FIFO 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.

4. (a) Explain the concept of external fragmentation.
How it can be avoided? (5)
- (b) Describe acyclic graph directories with the help of a diagram. (5)
- (c) 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 SCAN scheduling algorithm?
5. (a) Explain three requirements that a critical-section problem must satisfy. (3)
- (b) What is a process? Describe the states of a process with the help of a diagram. (6)

- (g) A bit, called the bit, is added to the hardware, of the computer to indicate the current mode : (3)
- _____ (0) or _____ (1).
- (h) Define the following terms w.r.t. magnetic disk : (3)
- (i) Transfer rate
- (ii) Cylinder
- (i) Give any three file attributes and their purpose. (3)
- (j) Define microkernel approach, its benefit and its function. (3)

Section – B

2. (a) For the following set of processes find the average waiting time using the Gantt chart for (10)
- (i) Shortest Job First algorithm

(ii) Priority scheduling algorithm

Process ID	Burst Time	Priority
P1	5	5
P2	3	4
P3	8	3
P4	2	1
P5	1	2

The process arrival order is P1, P2, P3, P4 and P5.

(b) What activities does an operating system perform for I/O management? (5)

3. (a) Discuss the problem of cache coherency with an example. (5)

(b) Is it possible to have concurrency but not parallelism? Explain. (5)

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

```
#include <iostream>

#include <unistd.h>

using namespace std;

int main()
{
    pid = fork();

    if (pid == 0)
    {
        cout << "Welcome!!" << endl;
    }

    else
    {
        cout << "Bye Bye!!" << endl;
    }

    return 0;
}
```