[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 1901 **GC-3** **Your Roll No.....**

Unique Paper Code : 42344304

Name of the Paper : Operating System

Name of the Course : **B.Sc. (Programme) Computer Science – CBCS**

Semester : III

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on the receipt of this question paper.
2. **Section A** is compulsory.
3. Attempt any **five** questions from **Section B.**

SECTION A (Compulsory)

1. (a) Identify type of operating system (Time sharing, Real time, Batch Processing) which is most suitable for the following applications.

   (i) Manufacturing unit

   (ii) Monthly payroll system

   (iii) Online gaming portal (3)

   (b) "In time sharing system, the context switch time should be less than the time quantum". Justify. (3)

   (c) Why is it important for operating system to differentiate between I/O bound and CPU bound job ? Name the scheduler that takes care of this requirement ? (2+1)

   (d) Why is a page size always power of 2 ? (2)

(e) What is the need of having secondary storage on a computer system ? (2)

(f) Suppose a computer system has available RAM of size 1GB out of which 512KB is used for user processes. Which memory management technique will be used to execute an application of size greater than 512KB and why ? (1+2)

(g) Write the Unix/Linux commands to do the following : (4)

(i) Display information of the users who are currently login.

(ii) Change permissions to RW for group, of a file "abc.dat"

(iii) Display name of the current directory in which user is working.

(iv) Move file "hello.txt" from current directory to its parent directory.

(h) Define shell. Name the default shell used in Unix/Linux environment. (1+1)

(i) When are absolute addresses generated in dynamic linking and why ? (3)

SECTION B (Attempt any five)

2. (a) Define Operating System. Describe any two services of the operating system from the system view. (1+3)

(b) Describe the following terms (briefly) : (6)

(i) Dispatch Latency

(ii) Bootstrap program

(iii) Process

3. (a) Explain advantages of using multiprocessors system over uni-processor system. (4)

(b) Differentiate between the following : (6)

(i) Device controller and Device driver

(ii) System Call and System Program

4. (a) Describe concurrent execution in a single-core system and parallel execution in multicore systems. (3)

(b) What is the advantage of having dual mode operation on a computer system ? Explain the need of hardware support for dual mode operation ? (3+1)

(c) Explain why programmers use APIs over actual system calls for reading/ writing data on the devices ? (3)

5. (a) Give name of system call used in LINUX to do the following : (3)

(i) Creating a process

(ii) Change permissions of the file

(iii) Waiting for the child process

(b) Give name of system programs used to (3)

(i) create or modify the content of files

(ii) compile a program written in high level language

(iii) load an application in the main memory

(c) Briefly explain one advantage and one disadvantage of using layered approach for building an operating system. (2+2)

6. (a) Consider the following information to answer the questions. (3+3)

Process	Burst time	Arrival Time
P1	5	0
P2	6	1
P3	2	4
P4	1	5

(i) Draw Gantt chart illustrating the execution of these processes using Round-robin (quantum = 2) and (non-preemptive) SJF.

(ii) Calculate turnaround time and waiting time for each process in both cases.

(b) Draw process state transition diagram showing different states a process can enter during its life span. Briefly describe each state. (2+2)

7. (a) Consider a logical address space of size 31KB and a page of size 2KB. Answer the following :

(i) Total number of pages required to handle the logical address space of size 31KB.

(ii) Total internal fragmentation assuming a frame of size 2KB.

(iii) Given 16-bits address space, find number of bits required for storing page number and number of bits required for page offset when mapping a logical address to physical address. (1+1+2)

(b) What is segmentation ? Describe the working of segmentation hardware. (2+4)

8. (a) Write down the steps required to handle a page fault in demand paging. Also draw a diagram for the same. (3+2)

(b) Write Unix/Linux command to remove duplicate lines from file 'input.txt' and store the result in file 'output.txt' (2)

(c) Write a shell script to compare two files. If files are same then remove one file else display contents of both files. (3)