# VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA

## Odd Mid Semester Examination for Academic Session 2024-25

| COURSE NAME: B.TECH | SEMESTER: 5th |
|---|---|

**BRANCH NAME: IT**

**SUBJECT NAME: OPERATING SYSTEMS**

| FULL MARKS: 30 | TIME: 90 Minutes |
|---|---|

Answer **All** Questions.

The figures in the right-hand margin indicate Marks. *Symbols carry usual meaning.*

| Q1. | | Answer all Questions. | [2 × 3] |
|---|---|---|---|
| | a) | What do you mean by CPU Burst time and I/O Burst time of a process? | - CO1 |
| | b) | Justify with reasons whether the following statement is true or false. "The kernel routines are written as functions that are called from user-level programs whenever some service is required from the operating system." | - CO2 |
| | c) | When a process is rolled out of memory, it loses its ability to use the CPU (at least for a while). Describe another situation where a process loses its ability to use the CPU, but where the process does not get rolled out. | - CO3 |

| Q2. | | | [8] |
|---|---|---|---|
| | | Clearly explain how the concept of SPOOLING helps in improving CPU utilization in traditional batch processing systems. Your printer connected to your computer uses SPOOLING. Point out what problem will you face if you want to print two documents simultaneously if you disable SPOOLING? Why? | - CO1 |

**OR**

Consider the following five processes, with their arrival times and execution times given in milliseconds. — CO1

| Process | Arrival Time | CPU Burst Time |
|---|---|---|
| P1 | 0 | 2 |
| P2 | 0 | 4 |
| P3 | 3 | 2 |
| P4 | 4 | 13 |
| P5 | 6 | 6 |

Draw the Gantt charts and estimate the average waiting times for the following scheduling algorithms:

i) Non-preemptive Shortest Job First

ii) Round-robin with time slice of 3 ms (assume P1 starts executing first in the beginning)

| Q3. | | | [8] |
|---|---|---|---|
| | | Suppose a short-term scheduling algorithm favours those processes that have used little processor time in the recent past. | - CO2 |
| | | a) Does the process favour I/O-bound processes or CPU-bound processes? Why or why not? | |

| | | | |
|---|---|---|---|
| | | b) Is the following statement True or False? Justify your answer. "This algorithm will continuously deny processor time to CPU-bound processes". | |
| | | OR | |
| | | Consider a time-sharing operating system that uses the round-robin scheduling algorithm. Suppose there are N processes in the ready queue, with time quantum $\Delta$ and context-switch overhead of $\delta$. Assume that the average CPU burst time of a process is $\beta$. Estimate the average waiting time for a process before it again gets chance to run on the CPU. Clearly state any assumptions you make. | - CO2 |
| Q4. | | | [8] |
| | | Consider a single level paging scheme. The page size is 4 KB and page table entry size is 4 bytes. The size of page table is 4 KB. Give the division of virtual address space. | - CO3 |
| | | OR | |
| | | Consider the following code snippet using the fork() system calls. Assume that the code compiles and runs correctly, and that the system calls run successfully without any errors. | - CO3 |

```c
#include <stdio.h>
#include <unistd.h>
int main()
{
    if (fork() || fork())
        fork();
    printf("1");
    return 0;
}
```

Find out the total number of times the printf statement is executed?