Operating Systems

Master of Computer Application
Second Year, First Semester
Session: 2021-22

Class Test - I
Date: 29/10/2021

Time: 1 Hour Full Marks: 30

Answer All Questions

1. For the following code segment determine the output and state the number of new processes that will be created. Provide necessary justifications.

```
int i=0;
do{
    if(fork()!=0)
        i=i+2;
    else
        i=i+k;
}while(i<=5);
printf("i = %d\n", i);
```

   Consider $k = (d\%2) + 2$, where d is the last of digit of your class roll number.

2. Consider the following set of processes, assumed to have arrived at time 0. Consider CPU scheduling algorithms Shortest Job First (SJF) and Round Robin (RR). For RR, assume that the processes are scheduled in the order P_1, P_2, P_3, P_4.

Processes	P_1	P_2	P_3	P_4
Burst Time (in ms)	9	2	6	7

   If time quantum for RR is K ms, then find the absolute value of the difference between the average turnaround times (in ms) of SJF and RR.

   Consider $K = (d\%3) + 2$, where d is the last of digit of your class roll number.

3. Consider a system with 3 processes that share instances of the same resource type. Each process require a maximum of K instances. Resource instances can be requested and released only one at a time. Determine the minimum number of instances of the resource type, that will always avoid deadlock. Provide necessary justifications.

   Consider $K = (d\%3) + 1$, where d is the last of digit of your class roll number.

4. An operating system uses the Banker's algorithm for deadlock avoidance when managing the allocation of three resource types X, Y, and Z to three processes P_0, P_1, and P_2. The table given below presents the current system state. Here, the Allocation matrix shows the current number of resources of each type allocated to each process and the Max matrix shows the maximum number of resources of each type required by each process during its execution.

	Allocation			Max		
	X	Y	Z	X	Y	Z
P_0	0	0	1	8	4	3
P_1	3	2	0	6	2	0
P_2	2	1	1	3	3	3

There are 3 units of type X, 2 units of type Y and 2 units of type Z still available. Determine whether the system is currently in a safe state.

9+9+6+6=30