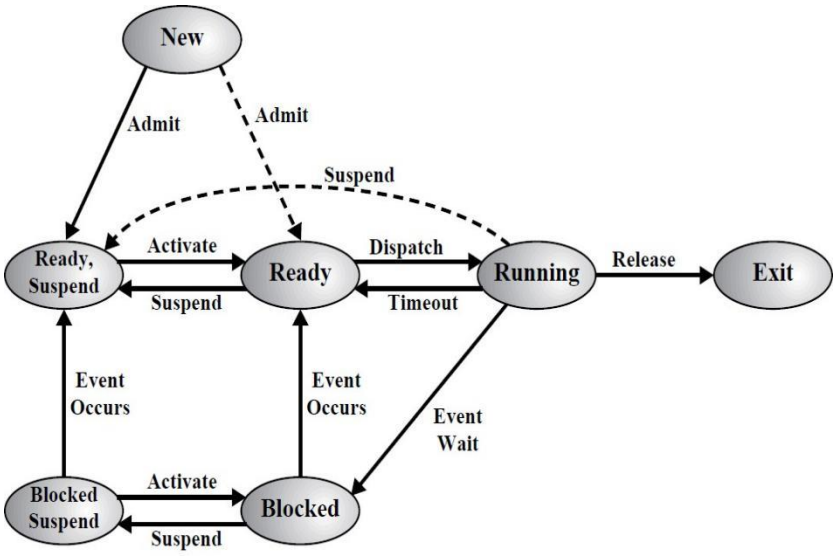
National University of Computer and Emerging Sciences, Lahore Campus				
	Course:	**Operating Systems**	**Course Code:**	**CS2006**
	Program:	**All sections of BS**	**Semester:**	5th
	Section:	**5A,5B**	**Total Marks:**	**10**
	Submission deadline:	**25-09-2023**	**Weight**	3.3
	Assignment:1 CLO-1		**Page(s):**	3
Instruction/Notes:	1. Understanding of the problems is part of the assignments. So, no query please. 2. You will get Zero marks if found any type of cheating. 3. 50 % deduction of over marks on the two-day late submission after due date 4. No submission after two days. IN-class submission. 5. **MUST BE HANDWRITTEN.**			

Question: 1-State all the two newly added **States** and their respective **transitions** in 7-state process model shown below in figure, also mention which scheduler will be responsible for doing the state change from one to other. As per our class discussion, medium term scheduler is responsible for SWAP IN and SWAP OUT (Swapping), After SWAP OUT which process will get the higher priority to SWAP IN back to the Ready queue or blocked queue and why? Justify your answer.



(b) With two suspend states

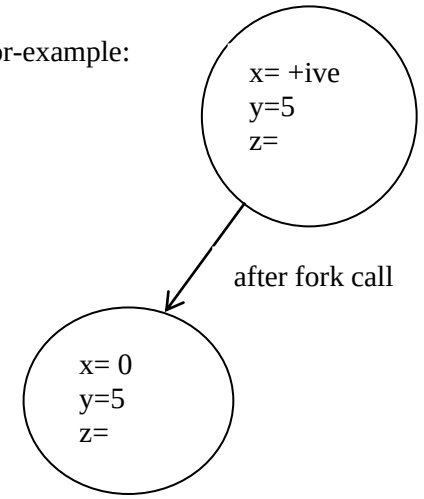
Question:2- Consider the following C program which is executed on a Unix/Linux system and using fork() system call , what will be the output of the following code? Justify your answer by making tree structure.

```
int Call_a_Function(int x, int y)
{
x++;
x = fork();              /* #4 */
if (x)
{
x = y;
}
else if (fork())         /* #5 */
{
x--;
y += x;
}
return x+y;
}
int main()
{
int x, y=5, z;
x = fork();              /* #1 */
if (x)
{
x = y;
z = Call_a_Function(x, y++);
}
else
{
(void) fork();           /* #2 */
z = x++;
y += z;
}
if (y > z)
{
(void) fork();           /* #3 */
}
printf("%d \n", x+y+z);
return 0;
}
```

Instructions:

Make a process tree along with values of x,y and z on each created process node and on each node how final values to be printed on output screen in **(x+y+z)** print statement:

For-example:



Question:3- Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

Process ID	Arrival Time	Burst Time	Priority
P_1	2	6	2
P_2	5	12	3
P_3	1	18	4
P_4	0	13	5
P_5	4	3	2

(a) Draw four Gantt charts illustrating the execution of these processes using SJF (Preemptive)/SRTF, Priority (Preemptive) the lowest the priority number the highest the priority, and Round Robin (Preemptive w.r.t Burst time) (quantum = 5) scheduling.

(b) What is the turnaround time of each process for each of the scheduling algorithms in part (a)?

(c) What is the waiting time of each process for each of the scheduling algorithms in part (a)?

(d) Which of the scheduling algorithm in part (a) results in the minimal average waiting time (over all processes)?