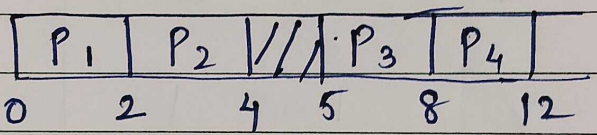
Mod 2

Process Scheduling

1) FCFS → First Come First Serve .

Process	AT	BT	CT	TAT	WT	RT
P_1	0	2	2	2	0	0
P_2	1	2	4	3	1	1
P_3	5	3	8	3	0	0
P_4	6	4	12	6	2	2

Gantt Chart :



TAT = CT - AT

WT = TAT - BT

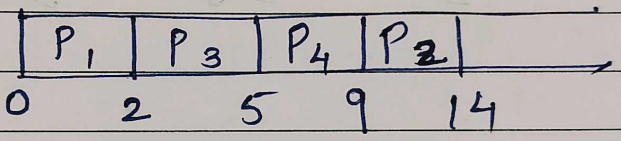
Non Preemptive → FCFS , SJF , SRTF

Preemptive → RR , Priority .

2) Shortest Job First

P	AT	BT	CT	TAT	WT	RT
P_1	0	2	2	2	0	0
P_2	3	5	14	11	6	6
P_3	1	3	5	4	1	1
P_4	1	4	9	8	4	4

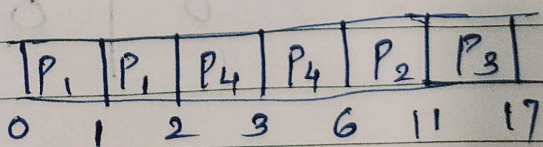
Gantt Chart :



3) SRTF - Shortest Remaining Time First

P	AT	BT	CT	TAT	WT	RT
P_1	0	2	2	2	0	0
P_2	3	5	11	8	3	3
P_3	1	6	17	16	10	10
P_4	1	4	6	5	1	1

Gantt Chart :



Teacher's Signature:.....

4) Round Robin

TQ = 3

Process	AT	BT	CT	TAT	WT	RT
P_1	0	7	25	25	18	0
P_2	3	9	31	28	19	3
P_3	1	10	35	34	24	2
P_4	5	12	38	33	21	4

Gantt Chart :

P_1	P_3	P_2	P_4	P_1	P_3	P_2	P_4	P_1	P_3
0	3	6	9	12	15	18	21	24 25	28

P_1	P_2	P_3	P_4
~~7~~	~~9~~	~~10~~	~~12~~
~~4~~	~~6~~	~~7~~	~~9~~
~~1~~	~~3~~	~~4~~	~~6~~
0	0	~~1~~	~~3~~
		0	0

~~$P_1 = 7$~~

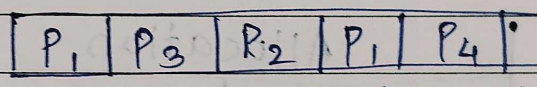
P_2	P_4	P_3	P_4
28	31	34	35 38

Teacher's Signature:.....

5) Priority

Priority	Process	AT	BT	CT	TAT	WT	RT
3	P_1	0	2	10	10	8	0
2	P_2	3	5	9	6	1	1
1	P_3	1	3	4	3	0	0
4	P_4	1	4	14	13	9	9

Gantt Chart :

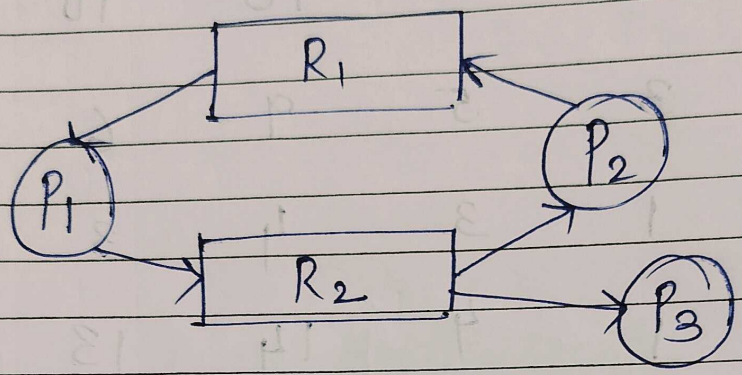


Assume lower the number higher the priority

Mod 3

Resource Allocation Graph.

1) Single Instance.



Process	Allocation		Request	
	R_1	R_2	R_1	R_2
P_1	1	0	0	1
P_2	0	1	1	0
P_3	0	1	0	0

$A \equiv (0, 0)$

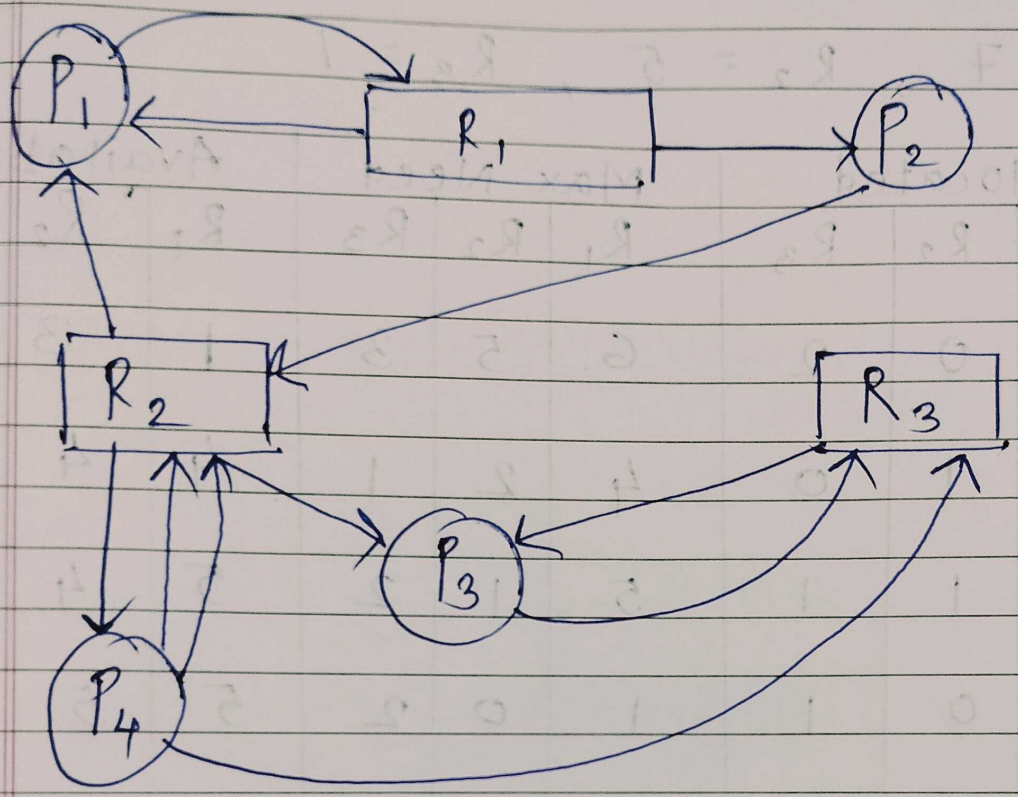
$P_3 \equiv (0, 1)$

$P_1 \equiv (1, 1)$

$P_2 \equiv (1, 2)$

Teacher's Signature:.....

2) Multi Instance.



Process	Allocation			Request		
	R_1	R_2	R_3	R_1	R_2	R_3
P_1	1	1	0	1	0	0
P_2	1	0	0	0	1	0
P_3	0	1	1	0	0	1
P_4	0	1	0	0	2	0

$A \equiv (0, 0, 0)$

∴ There exists a deadlock.

Banker's Algorithm.

$R_1 = 7$, $R_2 = 5$, $R_3 = 7$

Process	Allocated			Max Need			Available		
	R_1	R_2	R_3	R_1	R_2	R_3	R_1	R_2	R_3
P_1	1	0	2	6	5	3	1	3	1
P_2	3	1	0	4	2	1	4	4	1
P_3	0	1	1	5	1	2	5	4	2
P_4	1	0	1	1	0	2	5	5	3
P_5	1	0	2	5	2	3	6	5	5
	6	2	6				7	5	7

Remaining = Max Need - Allocated.

Remaining				
R_1	R_2	R_3		
5	5	1	✓	P_2 executes
1	1	1	✓	P_4 executes
5	0	1	✓	P_3 executes
0	0	1	✓	P_1 executes
4	2	1	✓	P_5 executes