Time 1.5 Hour   M.M.20

All questions are compulsory. Assume any missing data and mention it at the top of answer.

Ques 1   Recall the various deadlock detection and prevention algorithms we've discussed in the class, and consider the following snapshot of a system with five processes (P1, P2, P3, P4, P5) and four resources (R1, R2, R3, R4). There are no current outstanding queued unsatisfied requests.

Currently Available Resources

RI	R2	R3	R4
2	1	2	0

	Current allocation				Max need				Still needs			
Process	R1	R2	R3	R4	R1	R2	R3	R4	R1	R2	R3	R4
P1	0	0	1	2	0	0	3	2	0	0	2	0
P2	2	0	0	0	2	7	5	0	0	7	5	0
P3	0	0	3	4	6	6	5	6	6	6	2	2
P4	2	3	5	4	4	3	5	6	2	0	0	2
P5	0	3	3	2	0	6	5	2	0	3	2	0

a) Is this system currently deadlocked, or can any process become deadlocked? Why or why not? If not deadlocked, give an execution order.

b) If a request from a process P1 arrives for (0, 4, 2, 0), can the request be immediately granted? Why or why not? If yes, show an execution order.   3 marks

3 marks

Ques 2   A barbershop has a cutting room with one chair and a waiting room with "n" chairs.   10 marks
Customers enter the waiting room one at a time if the space is available; otherwise they go to another shop. Each time the barber finishes a haircut the customer leaves to go out to another store, and a waiting customer, if there is one, enters the cutting room and has a haircut. Customers may enter the waiting room one at a time, or waiting customers may enter the (empty) cutting room one at a time, but these events are mutually exclusive. If the barber discovers that the waiting room is empty, the barber falls asleep in the waiting room. An arriving customer finding the barber asleep wakes the barber and has a haircut; otherwise the arriving customer waits. Use semaphores to coordinate the operation of the barber and the clients.

Ques 3   Consider a code segment given below:

```
int main()
{
pid_t  child_pid;
child_pid=fork();
if(child_pid>0)
{
sleep(120);
}
else
{exit(0);
}
return 0;
}
```

What would be the ps listing in the following cases:
1. If you run ps within 2 minutes of the execution.   2 marks
2. If you run ps after the 2 minutes of the execution.   2 marks