5. [CO1] 1.a) Answer the following question: **[3 Marks]** 3 points

A call center for a telecommunications company handles a constant flow of customer calls and inquiries. Due to a limited number of service providers, most of the calls are dropped unanswered. To solve this problem they implemented a waiting lobby when all the lines are busy. Customers can wait till someone from the company picks up their call. Which concept of the Operating system has been employed in this scenario? Explain how it works in the context of the operating system.

Cpu scheduling- ready queue- short term scheduler

6. [CO1] 1.b) Answer the following question: **[2 Marks]** 2 points

What specific problem(s) of the layered structure were addressed through the adoption of a microkernel structure, and how were they resolved?

7. [CO1] 1.c) Find the output of the following code snippet. You need to type the answer in this form (as a response to this question) and show your working / tracing on paper. **Your output should exactly match with the original output. [3 Marks]** 3 points

```
int main(){
	int x=15;
	int y=5;
	i=fork();
	if(i<0){
		printf("fork failed\n");
	}
	else if(i==0){
		x=y-x;
		y=x+y;
	}
	else{
		wait();
		j=fork();
		if(j<0){
			printf("fork failed\n");
		}
		else if(j==0){
			x=x/y;
			y=x*y;
		}
		else{
			wait();
			x=x-y;
			y=x+y;
		}
	}
	printf("value of x: %d\n",x);
	printf("value of y: %d\n",y);

	return 0;
}
```

8. [CO1] 1.d) Answer the following question: **[3 Marks]** 3 points

In a Google Classroom, there are two types of users: teachers and students. Teachers create assignments with instructions and attached problem files, resulting in assignment slots in the classroom. Each slot contains instructions, the attached file, and individual placeholders for students to submit their assignments. Students can read instructions and problems from the attached file from that particular assignment slot. When a teacher creates an assignment, notification gets distributed to every teacher and student of the classroom. If a student submits an assignment every teacher of the classroom gets acknowledgement by a notification.

Logically explain what type of communication method was used in the above given scenario.

9. [CO2] 2.a) Type the average waiting time and turnaround time in this form (as a response to this question) and show your calculation on paper : **[5 Marks]** 5 points

Draw a Gantt chart and illustrate the execution of the process using the **Round Robin** scheduling algorithm **(time quantum = 6 units)**. **Calculate** the **average waiting** and **turnaround time.**

Process ID	Burst Time	Arrival Time	Priority
P1	9	5	1
P2	13	6	5
P3	7	11	4
P4	11	9	222222
P5	11	17	3

10. [CO2] 2.b) Answer the following question: **[2 Marks]** 2 points

Due to a calculation error, P4 has received an abnormally high priority value compared to other processes. Describe the problem this situation might cause by providing a scenario illustrating the issue, and suggest how to address it.

11. [CO3] 3.a) Type the answer in this form (as a response to this question) and show your calculation on paper : **[3 Marks]** 3 points

A system has processes to execute of which are 82% parallel. The number of cores currently available is 3. Calculate the number of cores required in order to increase the speedup approximately 1.5 times.

12. [CO3] 3.b) Answer the following question: **[2 Marks]** 2 points

Imagine you have a text editor that is running on multiple threads and has a python code execution feature. To achieve the code execution, the editor creates a child process and loads the python interpreter as a separate program. In this scenario, should the child process be a single-threaded or multi-threaded program? State your reasons.

13. [CO3] 3.c) Answer the following question: **[2 Marks]** 2 points

In a University, students, department, admin everyone share the same data structure. Students use it for registering their course, the admin office approves the course and the account department confirms their registration, and the department assigns a faculty for coordinating everything about the student. **Identify** which parallelism technique can be applicable here?

task parallalism- diffretn task on same student data