



**Department of Computer Science and Engineering**  
**Midterm Examination Spring 2023**  
**CSE 321: Operating Systems**

**Duration:** 1 Hour 15 Minutes

**Total Marks:** 25

Answer the following questions.  
Figures in the right margin indicate marks.

- 
1. a) **Briefly explain** dual mode operation of OS. [2]  
CO1 b) **Distinguish** between layered and microkernel OS structures. [3]  
c) Two processes (A and B) are distributed across multiple physical machines or networked systems. **Which** technique can be used to achieve inter-process communication in this scenario? Is it suitable for exchanging large amounts of data? **Provide** proper justification to support your answer. [2]  
d) **Find** the output of the following code snippet. [3]

```
const int len = 2;
int main(){
    int id;
    int a[] = {5,8};
    int b = len-1;
    id = fork();
    if (id < 0){
        printf("fork failed\n");
    }
    else if(id > 0){
        wait(NULL);
        printf("parent process executing\n");
    }
    else{
        printf("child process executing\n");
        a[b-1]=a[b-1]+2;
        a[b] = a[b]-3;
    }
    for(int i=0;i<len;i++){
        printf("value of a[%d]: %d\n",i,a[i]);
    }
    return 0;
}
```

2.  
CO2

Processes	Arrival Time	Burst Time
P1	0	11
P2	20	6
P3	14	9
P4	20	8
P5	15	8
P6	16	8
P7	2	2

a) **Draw** a Gantt chart and illustrate the execution of the process using the **Round Robin** scheduling algorithm (**time quantum = 5 units**). **Calculate** the **average waiting** and **turnaround time**,

[3+2]

b) **Apply Shortest Remaining Time First (SRTF)** scheduling algorithm. **Draw** the Gantt chart and **Calculate** the **average waiting** and **turnaround time**.

[2+2]

c) **Compare** the results and **identify** the most suitable scheduling algorithm in this scenario.

[1]

3. a) A system has processes to execute of which **45%** is parallel. If the number of cores is increased from **2** to **4**, **Explain** what will be the increase/decrease in performance. [2]
- CO3**
- b) **Describe** the multithreading model which is shown in the picture below. **Identify** the issue in this model and **suggest** another multithreading model which is free from that issue. [3]

