

**Department of Computer Science and Engineering**  
**Midterm Examination Fall 2022**  
**CSE 321: Operating Systems**  
**[Set B]**

**Duration:** 1 Hour

**Total Marks:** 25

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

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|------------|--|-----|
| 1.         | a) <b>Explain</b> dual-mode operation.                   | [3] |
| <b>CO1</b> | b) <b>Briefly explain</b> any two services of the OS.    | [2] |
|            |  |     |
| 2.         | a) <b>Explain</b> each process state with an example.    | [3] |
| <b>CO2</b> | b) <b>Find</b> the output of the following code snippet. | [4] |

```
int main(){
    int id;
    static int x = 10;
    int y = 5;
    id = fork();
    if (id < 0){
        printf("fork failed\n");
    }
    else if(id == 0){
        printf("child started\n");
        x=x+5;
        y=y-3;
        printf("values of x: %d & y: %d\n",x,y);
        printf("child finished\n");
    }
    else{
        wait(NULL);
        printf("parent started\n");
        printf("parent finished\n");
    }
    x=x+5;
    y=y-5;
    printf("values of x: %d & y: %d\n",x,y);
    printf("terminating\n");

    return 0;
}
```

3. a) "Multilevel-queue can prevent starvation problem"-**Justify** your answer. [2]  
C03

**Draw** a Gantt chart and illustrate the execution of the process using the **Round Robin** scheduling algorithm (**time quantum = 12 units**). **Calculate** the **average waiting time** and **number of context switching**. [3+2+1]

Processes	Arrival Time	Burst Time
P1	3	37
P2	12	17
P3	62	28
P4	63	21
P5	72	19

- b. Consider the following set of processes with the length of the CPU-burst time given in milliseconds. **Draw** the Gantt Charts illustrating the execution of these processes using preemptive priority (the highest number implies a higher priority). **Calculate** the **average turnaround** time for the below data set. [3+2 points] [3+2]

Processes	Priority	Arrival Time	Burst Time
P1	2	0	4
P2	4	1	2
P3	6	2	3
P4	10	3	5
P5	8	4	1
P6	12	5	4
P7	9	6	6