

1. Software interrupts are used for either user exceptions, or system calls. These are generated. Hardware interrupts are used for preempting and are unpredictable to the user process.
2. Privileged mode is the mode used for processes that can access any point in the memory.
 1. no
 2. yes
 3. yes
 4. yes
3. System calls are used so that user processes can perform some privileged actions (such as IO). System calls are implemented using software interrupts.
4.
 1. I0I— — —P1— — —I10I—P2—I11I—P3—I13I—P4—I14I— —P5— —I19I

| Process | Arrival Time | Burst | Priority | Finish | Turnaround |
|---------|--------------|-------|----------|--------|------------|
| P1 | 0 | 10 | 3 | 10 | 10 |
| P2 | 0 | 1 | 1 | 11 | 11 |
| P3 | 0 | 2 | 3 | 13 | 13 |
| P4 | 0 | 1 | 4 | 14 | 14 |
| P5 | 0 | 5 | 2 | 19 | 19 |
| Average | | | | | 13.4 |

2. I0I—P2—I1I—P4—I2I—P3—I4I— —P5— —I9I— —P1— —I19I

| Process | Arrival Time | Burst | Priority | Finish | Turnaround |
|---------|--------------|-------|----------|--------|------------|
| P1 | 0 | 10 | 3 | 19 | 19 |
| P2 | 0 | 1 | 1 | 1 | 1 |
| P3 | 0 | 2 | 3 | 4 | 4 |
| P4 | 0 | 1 | 4 | 2 | 2 |
| P5 | 0 | 5 | 2 | 9 | 9 |
| Average | | | | | 7 |

3. |0|—P2—|1|—P5—|6|—P1—|16|— —P3— —|18|— —P4— —|19|

| Process | Arrival Time | Burst | Priority | Finish | Turnaround |
|---------|--------------|-------|----------|--------|------------|
| P1 | 0 | 10 | 3 | 16 | 16 |
| P2 | 0 | 1 | 1 | 1 | 1 |
| P3 | 0 | 2 | 3 | 18 | 18 |
| P4 | 0 | 1 | 4 | 19 | 19 |
| P5 | 0 | 5 | 2 | 6 | 6 |
| Average | | | | | 12 |

4. |0| P1 |1| P2 |2| P3 |3| P4 |4| P5 |5| P1 |6| P3 |7| P5 |8| P1 |9| P5 |10| P1 |11| P5 |12| P1 |13| P5 |14| P1 |19|

| Process | Arrival Time | Burst | Priority | Finish | Turnaround |
|---------|--------------|-------|----------|--------|------------|
| P1 | 0 | 10 | 3 | 19 | 19 |
| P2 | 0 | 1 | 1 | 2 | 2 |
| P3 | 0 | 2 | 3 | 7 | 7 |
| P4 | 0 | 1 | 4 | 4 | 4 |
| P5 | 0 | 5 | 2 | 14 | 14 |
| Average | | | | | 9.2 |

5.

1. CPU: |0|—P1—|10|—P2—|15|—P3—|20|—P1—|30|—P2—|35|—P3—|40| IDLE |45|
—P1—|50|—P2—|55|—P3—|60| IDLE |70| —P1—|80|—P2—|85|—P3—|90|

IO: |10|—P1—|20|—P2—|25|—P3—|35|—P1—|45|—P2—|50|—P3—|50|—P1—|
60|—P1—|70|—P2—|75|—P3—|80|

| Process | Arrival Time | Burst | Priority | Finish | Turnaround |
|---------|--------------|-------|----------|--------|--------------------|
| P1 | 0 | 70 | 3 | 80 | 10 |
| P2 | 0 | 35 | 1 | 75 | 40 |
| P3 | 0 | 50 | 3 | 80 | 30 |
| Average | | | | | 26.666666666666666 |

2. CPU: I0I—p2—I5I—p3—I10I—P1—I20I—p2—I25I—p3—I35I—p2—I40I—p1—I50I—p3—I55I—p2—I60I—p1—I70I—p3—I75I IDLE I80I—p1—I90I

IO: I5I—p2—I10I—p3—I20I—P1—I30I—p2—I35I—p3—I45I—p2—I50I—p1—I60I—p3—I70I—p1—I80I

| Process | Arrival Time | Burst | Priority | Finish | Turnaround |
|---------|--------------|-------|----------|--------|-------------------|
| P1 | 0 | 70 | 3 | 90 | 20 |
| P2 | 0 | 35 | 1 | 60 | 25 |
| P3 | 0 | 50 | 3 | 75 | 25 |
| Average | | | | | 23.33333333333333 |

4 5 5 8 10 2 5 5
 3. CPU: I0I p1p2p3 I12I p1p2 I14I p3 I15I p1 I18I p1p2 I20I p2 I23I IDLE I29I p3 I34I
 4 9 5 10 5 5 10 5
 IDLE I39I p1 I43I p1p2 I48I p1 I49I IDLE I54I p3 I59I p2 I64I IDLE I69I p1 I79I p3 I84I IDLE I89I
 p1 I99I

IO: I14I p2 I19I p3 I29I p1 I39I p2 I44I p3 I54I p2 I59I p1 I69I p3 I79I p1 I89I

| Process | Arrival Time | Burst | Priority | Finish | Turnaround |
|---------|--------------|-------|----------|--------|--------------------|
| P1 | 0 | 70 | 3 | 99 | 29 |
| P2 | 0 | 35 | 1 | 64 | 29 |
| P3 | 0 | 50 | 3 | 84 | 34 |
| Average | | | | | 30.666666666666666 |