**(A)**

**First Come First Serve**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Process | Burst | Finish | Arrival time | Turnaround time  (finish – arrival) | Waiting time  (turnaround – burst) |
| P1 | 8 | 8 | 0 | 8 | 0 |
| P2 | 6 | 14 | 0 | 14 | 8 |
| P3 | 1 | 15 | 0 | 15 | 14 |
| P4 | 9 | 24 | 0 | 24 | 15 |
| P5 | 3 | 27 | 0 | 27 | 24 |
| Average | | | | (8 +14 +15+24+27)/5 = 17.6 ms | (0 + 8 +14 +15+24)/5 = 12.2 ms |

**Shortest Job First**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Process | | Burst | Finish | Arrival time | Turnaround Time (finish – arrival) | Waiting Time (turnaround – burst) |
| P3 | 1 | | 1 | 0 | 1 | 0 |
| P5 | 3 | | 4 | 0 | 4 | 1 |
| P2 | 6 | | 10 | 0 | 10 | 4 |
| P1 | 8 | | 18 | 0 | 18 | 10 |
| P4 | 9 | | 27 | 0 | 27 | 18 |
| Average | | | | | (1+4+10+18+27)/5 = 12 m/s | (0+1+4+10+18)/5 = 6.6 m/s |

**Preemptive Proority Scheduling**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Process | Burst | Finish | Nice | Turnaround time  (finish – arrival(0)) | Waiting time  (turnaround – burst) |
| P2 | 6 | 6 | 1 | 6 | 0 |
| P3 | 1 | 7 | 2 | 7 | 6 |
| P4 | 9 | 16 | 2 | 16 | 7 |
| P5 | 3 | 19 | 3 | 19 | 16 |
| P1 | 8 | 27 | 4 | 27 | 19 |
| Average | | | | (27+6+7+16+19)/5 = 15 ms | (19+0+6+7+16)/5 = 9.6 ms |

**Round Robin (assume a quantum of 1 ms)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Process | Burst | Finish | Arrival time | Turnaround time  (finish – arrival) | Waiting time  (turnaround – burst) |
| P1 | 8 | 25 | 0 | 25 | 17 |
| P2 | 6 | 21 | 0 | 21 | 15 |
| P3 | 1 | 3 | 0 | 3 | 2 |
| P4 | 9 | 27 | 0 | 27 | 18 |
| P5 | 3 | 13 | 0 | 13 | 10 |
| Average | | | | (25+21+3+27+13)/5 = 17.8 ms | (17+15+2+18+10)/5=  12.4 m/s |

1. Which of the four algorithms has the shortest wait time? **Shortest Job First**
2. Which has the fastest average turnaround time? **Shortest Job First**

**(B)**

**First Come First Serve**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Process | Burst | Finish | Arrival time | Turnaround time  (finish – arrival) | Waiting time  (turnaround – burst) |
| P1 | 8 | 8 | 0 | 8 | 0 |
| P2 | 6 | 23 | 2 | 21 | 15 |
| P3 | 1 | 24 | 2 | 22 | 21 |
| P4 | 9 | 17 | 1 | 16 | 7 |
| P5 | 3 | 27 | 3 | 24 | 21 |
| Average | | | | (8+21+22+16+24)/5 = 18 m/s | (0+15+21+7+21)/5 = 12 m/s |

**Shortest Job First**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Process | | Burst | Finish | Arrival time | Turnaround Time (finish – arrival) | Waiting Time (turnaround – burst) |
| P1 | 8 | | 8 | 0 | 8 | 0 |
| P3 | 1 | | 9 | 2 | 7 | 6 |
| P5 | 3 | | 12 | 3 | 9 | 6 |
| P2 | 6 | | 18 | 2 | 16 | 10 |
| P4 | 9 | | 27 | 1 | 26 | 17 |
| Average | | | | | (8+7+9+16+26/5 = 13.2 m/s | (0+6+6+10+17)/5 = 7.8 m/s |

**Preemptive Proority Scheduling**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Process | arrival | Burst | Finish | Nice | Turnaround time  (finish – arrival) | Waiting time  (turnaround – burst) |
| P1 | 0 | 8 | 27 | 4 | 27 | 19 |
| P4 | 1 | 9 | 16 | 2 | 15 | 6 |
| P2 | 2 | 6 | 8 | 1 | 6 | 0 |
| P3 | 2 | 1 | 17 | 2 | 15 | 14 |
| P5 | 3 | 3 | 27 | 3 | 17 | 14 |
| Average | | | | | (27+15+6+15+17)/5 = 16 ms | (19+0+6+14+14)/5 = 10.6 ms |

**Round Robin (assume a quantum of 1 ms)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Process | arrival | Burst | Finish | Nice | Turnaround time  (finish – arrival) | Waiting time  (turnaround – burst) |
| P1 | 0 | 8 | 25 | 4 | 25 | 17 |
| P4 | 1 | 9 | 27 | 2 | 26 | 17 |
| P2 | 2 | 6 | 22 | 1 | 20 | 14 |
| P3 | 2 | 1 | 4 | 2 | 2 | 1 |
| P5 | 3 | 3 | 13 | 3 | 10 | 7 |
| Average | | | | | (25+26+20+2+10)/5 = 16.6 ms | (17+17+14+1+7)/5 = 11.2 ms |

1. Which of the four algorithms has the shortest wait time? **Shortest Job First**
2. Which has the fastest average turnaround time? **Shortest Job First**