Solution 1:

**Formulas:**

Turn Around time = Execution time – Arrival time

Waiting time = Turn Around time – Burst time



**Gantt Chart :**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **P3** |  | **P1** | **P5** | **P2** | **P4** |

0 2 3 7 10 13 14

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Process Id | Arrival time | Burst time | Execution time | Turn Around time | Waiting Time |
| P1 | 3 | 4 | 7 | 7-3=4 | 4-4=0 |
| P2 | 5 | 3 | 13 | 8 | 5 |
| P3 | 0 | 2 | 2 | 2 | 0 |
| P4 | 5 | 1 | 14 | 9 | 8 |
| P5 | 4 | 3 | 10 | 6 | 3 |

Average Turn Around time = (4 + 8 + 2 + 9 + 6) / 5

= 29 / 5

= 5.8

Average waiting time = (0 + 5 + 0 + 8 + 3) / 5

= 16 / 5

= 3.2

Solution 2:

**Formulas:**

Turn Around time = Execution time – Arrival time

Waiting time = Turn Around time – Burst time



**Gantt Chart :**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **P4** | **P2** | **P1** | **P2** | **P3** | **P5** | **P4** |

0 1 3 4 6 8 11 16

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Process Id | Arrival time | Burst time | Execution time | Turn Around time | Waiting Time |
| P1 | 3 | 1 | 4 | 4-3=1 | 1-1=0 |
| P2 | 1 | 4 | 6 | 5 | 1 |
| P3 | 4 | 2 | 8 | 4 | 2 |
| P4 | 0 | 6 | 16 | 16 | 10 |
| P5 | 2 | 3 | 9 | 9 | 6 |

Average Turn Around time = (1 + 5 + 4 + 16 + 9) / 5

= 35 / 5

= 7

Average waiting time = (0 + 1 + 2 + 10 + 6) / 5

= 19 / 5

= 3.8

Solution 3:

**Formulas:**

Turn Around time = Execution time – Arrival time

Waiting time = Turn Around time – Burst time



**Gantt Chart :**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **P1** | **P2** | **P3** | **P4** | **P3** | **P6** | **P5** | **P2** | **P1** |

0 1 2 3 4 6 7 9 13 19

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Process Id | Arrival time | Burst time | Execution time | Turn Around time | Waiting Time |
| P1 | 0 | 7 | 19 | 19-0=19 | 19-7=12 |
| P2 | 1 | 5 | 13 | 12 | 7 |
| P3 | 2 | 3 | 6 | 4 | 1 |
| P4 | 3 | 1 | 4 | 1 | 0 |
| P5 | 4 | 2 | 9 | 5 | 3 |
| P6 | 5 | 1 | 7 | 2 | 1 |

Average Turn Around time = (19 + 12 + 4 + 1 + 5 + 2) / 6

= 43 / 6

= 7.17

Average waiting time = (12 + 7 + 1 + 0 + 3 + 1) / 6

= 24 / 6

= 4

Solution 4:

**Formulas:**

Turn Around time = Execution time – Arrival time

Waiting time = Turn Around time – Burst time



**Gantt Chart :**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **P1** | **P2** | **P3** | **P1** | **P4** | **P5** | **P2** | **P1** | **P5** |

0 2 4 5 7 9 11 12 13 14

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Process Id | Arrival time | Burst time | Execution time | Turn Around time | Waiting Time |
| P1 | 0 | 5 | 13 | 13-0=13 | 13-5=8 |
| P2 | 1 | 3 | 12 | 11 | 8 |
| P3 | 2 | 1 | 5 | 3 | 2 |
| P4 | 3 | 2 | 9 | 6 | 4 |
| P5 | 4 | 3 | 14 | 10 | 7 |

Average Turn Around time = (13+11+3+6+10) / 5

= 43 / 5

= 8.6

Average waiting time = (8+8+2+4+7) / 5

= 29 / 5

= 5.8