**NAME – PANKAJ PATIL**

**ROLL NO – 220350320094**

**SUBJECT – OS ASSIGNMENT 1**

**Question 1**

 Consider the set of 5 processes whose arrival time and burst time are given below-

|  |  |  |
| --- | --- | --- |
| **Process Id** | **Arrival time** | **Burst time** |
| P1 | 3 | 4 |
| P2 | 5 | 3 |
| P3 | 0 | 2 |
| P4 | 5 | 1 |
| P5 | 4 | 3 |

 If the CPU scheduling policy is FCFS, calculate the average waiting time and average turn around time.

**Solution :-**

**Queue formation :-**

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

**Gantt chart representation :-**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| P3 | ideal | P1 | P5 | P2 | P4 |

0 2 3 7 10 13 14

**Turn-around Time :-**

TAT(P1) = CT(P1) – AT(P1) = 7 – 3 = 4

TAT(P2) = CT(P2) – AT(P2) = 13 – 5 = 8

TAT(P3) = CT(P3) – AT(P3) = 2 – 0 = 2

TAT(P4) = CT(P4) – AT(P4) = 14 – 5 = 9

TAT(P5) = CT(P5) – AT(P5) = 10 – 4 = 6

**AVERAGE TAT** = ( 4 + 8 + 2 + 9 + 6 ) / 5 = 5.8 ns

**Waiting Time :-**

WT(P1) = TAT(P1) – BT(P1) = 4 – 4 =0

WT(P2) = TAT(P2) – BT(P2) = 8 – 3 = 5

WT(P3) = TAT(P3) – BT(P3) = 2 – 2 = 0

WT(P4) = TAT(P4) – BT(P4) = 9 – 1 = 8

WT(P5) = TAT(P5) – BT(P5) = 6 – 3 = 3

**AVERAGE WT** = ( 0 + 5 + 0 + 8 + 3 ) / = 3.2 ns

**Question 2**

 Consider the set of 5 processes whose arrival time and burst time are given below-

|  |  |  |
| --- | --- | --- |
| **Process Id** | **Arrival time** | **Burst time** |
| P1 | 3 | 1 |
| P2 | 1 | 4 |
| P3 | 4 | 2 |
| P4 | 0 | 6 |
| P5 | 2 | 3 |

 If the CPU scheduling policy is SJF preemptive, calculate the average waiting time and average turn around time.

**Solution : -**

**Queue formation : -**

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

**Gantt chart representation**

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

**0 1 3 4 6 8 11 14**

**Turn-around Time :-**

TAT(P1) = CT(P1) – AT(P1) = 4 – 3 = 1

TAT(P2) = CT(P2) – AT(P2) = 6 – 1 = 5

TAT(P3) = CT(P3) – AT(P3) = 8 – 4 = 4

TAT(P4) = CT(P4) – AT(P4) = 16 – 0 = 16

TAT(P5) = CT(P5) – AT(P5) = 11 – 2 = 9

**AVERAGE TAT** = ( 1 + 5 + 4 + 16 + 9 ) / 5 = 7 ns

**Waiting Time :-**

WT(P1) = TAT(P1) – BT(P1) = 1 – 1 =0

WT(P2) = TAT(P2) – BT(P2) = 5 – 4 = 1

WT(P3) = TAT(P3) – BT(P3) = 4 – 2 = 2

WT(P4) = TAT(P4) – BT(P4) = 16 – 6 = 10

WT(P5) = TAT(P5) – BT(P5) = 9 – 3 = 6

**AVERAGE WT** = ( 0 + 1 + 2 + 10 + 6 ) / = 3.8 ns

**Question 3**

 Consider the set of 6 processes whose arrival time and burst time are given below-

|  |  |  |
| --- | --- | --- |
| **Process Id** | **Arrival time** | **Burst time** |
| P1 | 0 | 7 |
| P2 | 1 | 5 |
| P3 | 2 | 3 |
| P4 | 3 | 1 |
| P5 | 4 | 2 |
| P6 | 5 | 1 |

If the CPU scheduling policy is shortest remaining time first, calculate the average waiting time and average turn around time.

**Solution : -**

**Queue formation**

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

**Gantt chart representation**

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

**0 1 2 3 4 5 6 7 9 13 19**

**Turn-around Time :-**

TAT(P1) = CT(P1) – AT(P1) = 19 – 0 = 19

TAT(P2) = CT(P2) – AT(P2) = 13 – 1 = 12

TAT(P3) = CT(P3) – AT(P3) = 7 – 2 = 5

TAT(P4) = CT(P4) – AT(P4) = 4 – 3 = 1

TAT(P5) = CT(P5) – AT(P5) = 9 – 4 = 5

TAT(P6) = CT(P6) – AT(P6) = 6 – 5 = 1

**AVERAGE TAT** = ( 19 + 12 + 5 + 1 + 5 + 1 ) / 6 = 7.16 ns

**Waiting Time :-**

WT(P1) = TAT(P1) – BT(P1) = 19 – 7 =12

WT(P2) = TAT(P2) – BT(P2) =12 – 5 = 7

WT(P3) = TAT(P3) – BT(P3) = 5 – 3 = 2

WT(P4) = TAT(P4) – BT(P4) = 1 – 1 = 0

WT(P5) = TAT(P5) – BT(P5) = 5 – 2 = 3

WT(P6) = TAT(P6) – BT(P6) = 1 – 1 =0

**AVERAGE WT** = ( 12 + 7 + 2 + 0 + 4 + 0 ) / 6 = 4 ns

**Question 4**

Consider the set of 5 processes whose arrival time and burst time are given below-

|  |  |  |
| --- | --- | --- |
| **Process Id** | **Arrival time** | **Burst time** |
| P1 | 0 | 5 |
| P2 | 1 | 3 |
| P3 | 2 | 1 |
| P4 | 3 | 2 |
| P5 | 4 | 3 |

 If the CPU scheduling policy is Round Robin with time quantum = 2 unit, calculate the average waiting time and average turn around time.

**Solution :-**

**Queue representation**

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

**Gantt chart representation**

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

**0 2 4 5 7 9 11 12 13 14**

**Turn-around Time :-**

TAT(P1) = CT(P1) – AT(P1) = 13 – 0 = 13

TAT(P2) = CT(P2) – AT(P2) = 12 – 1 = 11

TAT(P3) = CT(P3) – AT(P3) = 5 – 2 = 3

TAT(P4) = CT(P4) – AT(P4) = 9 – 3 = 6

TAT(P5) = CT(P5) – AT(P5) = 14 – 4 = 10

**AVERAGE TAT** = ( 13 +11 + 3 + 6 + 10 ) / 5 = 8.6 ns

**Waiting Time :-**

WT(P1) = TAT(P1) – BT(P1) = 13 – 5 = 8

WT(P2) = TAT(P2) – BT(P2) =11 – 3 = 8

WT(P3) = TAT(P3) – BT(P3) = 3 – 1 = 2

WT(P4) = TAT(P4) – BT(P4) = 6 – 2 = 4

WT(P5) = TAT(P5) – BT(P5) = 10 – 3 = 7

**AVERAGE WT** = ( 8 + 8 + 2 + 4 + 7 ) / 5 = 5.8 ns