Operating Systems (CS315)

UNIT-1

**[One Mark Questions]**

1. What is operating System?
2. What is kernel?
3. List out the different types of operating systems?
4. What is process?
5. What is program counter?
6. List out various operations performed on the process
7. What is context switching?
8. What is the degree of multiprogramming?
9. What is dispatcher?
10. Define the response time of the process.
11. Define the burst time of the process.
12. What is the turnaround time of the process?
13. What are the goals of the CPU Scheduling?
14. What is the formula to predict or expect the burst time of coming process using SJF Scheduling?
15. What is starvation?
16. What is the use of aging?
17. What is convoy effect?
18. What is scheduler used by Linux operating system?
19. What is preemptive scheduler?
20. What is non-preemptive CPU scheduler?

**[Two Mark Questions]**

1. What is short term scheduler? Where it is used.
2. List the sates of process.
3. Write the attributes of a process.
4. What is mid (medium) term scheduling?
5. What is PCB? What is the use of PCB?
6. An operating system uses shortest remaining time first (SRTF) process scheduling algorithm. Consider the arrival times and execution times for the following processes.

|  |  |  |
| --- | --- | --- |
| Process | Burst Time | Arrival Time |
| P1 | 20 | 0 |
| P2 | 25 | 15 |
| P3 | 10 | 30 |
| P4 | 15 | 45 |

What is the waiting time for the process p2?

1. An operating system uses shortest remaining time first (SRTF) process scheduling algorithm. Consider the arrival times and execution times for the following processes.

|  |  |  |
| --- | --- | --- |
| Process | Burst Time | Arrival Time |
| P1 | 20 | 0 |
| P2 | 25 | 15 |
| P3 | 10 | 30 |
| P4 | 15 | 45 |

What is the waiting time for the process p4?

1. An operating system uses shortest remaining time first (SRTF) process scheduling algorithm. Consider the arrival times and execution times for the following processes.

|  |  |  |
| --- | --- | --- |
| Process | Burst Time | Arrival Time |
| P1 | 20 | 0 |
| P2 | 25 | 15 |
| P3 | 10 | 30 |
| P4 | 15 | 45 |

What is the average waiting time of the process?

1. An operating system uses shortest remaining time first (SRTF) process scheduling algorithm. Consider the arrival times and execution times for the following processes.

|  |  |  |
| --- | --- | --- |
| Process | Burst Time | Arrival Time |
| P1 | 20 | 0 |
| P2 | 25 | 15 |
| P3 | 10 | 30 |
| P4 | 15 | 45 |

What is the average turnaround time of the process?

1. Consider the following code fragment and write the outcome of the code.

int a=5;

if(fork()==0)

{

a=a+5;

printf(“%d”,a);

}

else

{

a=a-5;

printf(“%d”,a);

}

**[Five Mark Questions]**

1. Explain shortest job first scheduling algorithm. Calculate the average waiting time and turnaround time both the algorithms with the following data.

|  |  |
| --- | --- |
| **Process** | **Burst Time** |
| P1 | 6 |
| P2 | 8 |
| P3 | 7 |
| P4 | 3 |

1. Define process and write the state diagram of the process. Describe the contents of a Process Control Block (PCB).
2. Define Context Switch. Differentiate between preemptive and non-preemptive scheduling. Explain the various process states.
3. Consider the following 4 processes with the length of CPU burst time given in milliseconds together with their respective arrival time.

|  |  |  |
| --- | --- | --- |
| **Process** | **Arrival time** | **Burst Time** |
| P1 | 0 | 8 |
| P2 | 1 | 4 |
| P3 | 2 | 9 |
| P4 | 3 | 5 |

If Preemptive SJF scheduling is used then what is the average waiting time.

1. Explain priority scheduling with example.

**[Ten Mark Questions]**

1. Consider the following 4 processes with the length of CPU burst time given in milliseconds together with their respective arrival time.

|  |  |  |
| --- | --- | --- |
| **Process** | **Arrival Time** | **Burst Time** |
| P1 | 0 | 8 |
| P2 | 1 | 4 |
| P3 | 2 | 9 |
| P4 | 3 | 5 |

i) Find the Average turnaround time and average waiting time using FCFS Scheduling. [4M]

ii) Find the Average turnaround time and average waiting time using non-preemptive SJF.[3M]

iii) Find the Average turnaround time and average waiting time using preemptive SJF. [3M]

2. a) Explain Round Robin(RR) scheduling with example. Differentiate between long term scheduler with short term scheduler. [4M]

b) Consider the following 5 processes with the length of CPU burst time given in milliseconds (assuming their arrival time be 0) Find the average waiting time using FCFS and SJF Scheduling algorithms [6M]

|  |  |
| --- | --- |
| **Process** | **Burst Time** |
| P1 | 10 |
| P2 | 29 |
| P3 | 3 |
| P4 | 7 |
| P5 | 12 |

3. Consider the following set of processes, with the length of the CPU burst given in milliseconds:

The processes are assumed to have arrived in the order P1, P2, P3, P4, and P5 all at time 0

i) Draw four GANTT chart that illustrate the execution of these processes using the following scheduling algorithms: FCFS, SJF, non-preemptive priority (a smaller priority number implies a higher priority), and RR (quantum = 1).

ii) What is the turn-around time and waiting time of each process for each of the scheduling algorithms in part (i)

iii) Which of the algorithms in part (i) results in the minimum average waiting time (over all processes).

|  |  |  |
| --- | --- | --- |
| Process | Burst Time | Priority |
| P1 | 10 | 3 |
| P2 | 1 | 1 |
| P3 | 2 | 3 |
| P4 | 1 | 4 |
| P5 | 5 | 2 |

4. Write about multi level queue CPU scheduling algorithms with and without feedback

5. Explain the criteria on which the scheduling algorithms are based and Explain short term, Medium term and long term schedulers.

6. a) What is Inter Process Communication? Explain about direct and indirect communication.

b) Consider the following set of process, with the length of the CPU burst time given in milliseconds.

|  |  |  |
| --- | --- | --- |
| Process | Burst Time | Priority |
| P1 | 10 | 10 |
| P2 | 1 | 1 |
| P3 | 2 | 2 |
| P4 | 1 | 1 |
| P5 | 5 | 5 |

Calculate the average wait and turnaround times using SJF scheduling algorithm.

7. a) Define process? Explain process states.

b) What is the difference between pre-emptive and non-preemptive scheduling? Explain an algorithm for each scheduling type.

8. What is preemptive and non preemptive scheduling? Consider the following set of processes with the length of CPU burst time given in milliseconds: What will bet the average Turnaround and average waiting time for these processes using Preemptive and Non Preemptive priority Scheduling algorithms?

(Assume large priority number has higher priority)

|  |  |  |  |
| --- | --- | --- | --- |
| **Process** | **Arrival time** | **Burst Time** | **Priority** |
| P1 | 0.0000 | 4 | 3 |
| P2 | 1.0001 | 3 | 4 |
| P3 | 2.0001 | 3 | 6 |
| P4 | 3.0001 | 5 | 5 |

9. Suppose the following job arrive for processing at the times indicated. Each job will run the listed amount of time.

|  |  |  |  |
| --- | --- | --- | --- |
| **Job** | **1** | **2** | **3** |
| Arrial Time | 0.0 | 0.4 | 1.0 |
| Burst Time | 8 | 4 | 1 |

i) Give a Gantt chart illustrating the execution at three jobs, using non pre-emptive FCFS and SJF scheduling algorithms?

ii) What is turnaround time and waiting time of each job for the above algorithms?

10. a) Explain about different states of a process with the help a state transition diagram.

b) Describe the working of the following scheduling algorithms using a sample of five processes with appropriate CPU burst times.

i) FCFS ii) Priority scheduling iii) Round robin scheduling with time quantum of 4 units