**Assignment 2(OS)**

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Ans 1) a) **FCFS:**

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

**0 3 9 13 15**

**b)SJF:**

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

**0 3 9 13 15**

**b)SRT:**

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

**0 3 4.001 5.001 6.001 8.001 10.001 15**

**c) Round Robin(quantum=2)**

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

**0 2 4 5 7 9 11 13 15**

**d) Round Robin(quantum=1)**

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

**0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15**

**Ans 2)FCFS:**

Turn Around Time:

P1=3-0=3

P2=9-1.001=7.999

P3=13-4.001=8.999

P4=15-6.001=8.999

**SJF:**

Turn Around Time:

P1=3-0=3

P2=9-1.001=7.999

P3=13-4.001=8.999

P4=15-6.001=8.999

**SRT:**

Turn Around Time:

P1=3-0=3

P2=15-1.001=13.999

P3=8.001-4.001=4

P4=10.001-6.001=4

**Round Robin(q=2):**

Turn Around Time:

P1=5-0=5

P2=13-1.001=11.999

P3=15-4.001=10.999

P4=11-6.001=4.999

**Round Robin(q=1):**

Turn Around Time:

P1=4-0=4

P2=15-1.001=13.999

P3=14-4.001=9.999

P4=12-6.001=5.999

**Average throughput for the processes:** No. of process/ Total Time Taken = 4/15 =>0.2666

**Ans 3) (a) Preemptive:**

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

**0 1.0001 2.0001 5.0001 10.0001 12.0001 15**

**(b) Non- Preemptive:**

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

**0 4 7 12 15**

**Ans 4)** The job will be interrupted 4 times and in the 5th queue it will terminates. The process will be interrupted at 2s in the 1st queue, at 9s in the 2nd queue, at 21s in the 3rd queue, at 38s in the 4th queue and in the 5th queue it will terminate.

**Ans 5)**

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

**0 2 6 9 11 21 31**

Average throughput= 5/31=0.16129.

**Ans 6)**Non-preemptive scheduling will not be a good choice for interactive system as it does not give up the CPU until the current process is executed which can sometime lead to the starvation of process in the CPU.

**Ans 7)**When parent process dies UNIX provide init as parent process for the child .A parent process should acknowledge that a child process has exited from wait() system call otherwise the child will become zombie.

**Ans 8)**

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

**0 20 30 40 55 70**

Waiting time for P2 is 5+10=15.

**Ans 9)**SRT and RR requires timer interrupt for the CPU.As this allows the current process to be interrupted and allow CPU to give time to other processes. It select the next process to run from the ready queue or resume the currently running process, if the quantum has not expired in the case of RR and if there are no processes in the ready queue with a shorter remaining time as in case of SRT.

**Ans 10)**a) Preemptive:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **P3** | **P2** | **P1** | **P2** | **P3** |

**0 3 5 25 34 45**

Turn Around time=34-3=31.

Non-Preemptive:

|  |  |  |
| --- | --- | --- |
| **P3** | **P1** | **P2** |

**0 15 25 33**

Turn Around time=33-3=30.

**Ans 11)**Total Time: 3/20+2/5+1/10

=0.15+0.4+0.1

=0.65<1, So, it can be scheduled.

The schedule is:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| T2 | T1 | T3 | T2 | Processor  idle | T2 | T3 |

0 2 5 6 8 10 12 13

At time t=0, the three tasks are ready to execute and the task with the smallest absolute deadline is T2 and T2 is executed. At time t=2, task T2 completes.The task with the smallest absolute deadline is now T1 and T1 executes. At time t=5,task T1 completes and task T2 is again ready, However, the task with the smallest absolute deadline is now T3, which begins to execute. When T3 finishes, T2 again starts executing.

**Ans 12)** The laxity values are computed at task arrival time. At time t=0, the three tasks are ready to execute. Relative laxity values of the tasks are:

L(T1)=7-3=4

L(T2)=4-2=2

L(T3)=8-1=7

Thus the task with the smallest relative laxity is T2. Then T2 is executed. At time t=5, a new request of task T2 enters the system. Its relative laxity value is equal to the relative laxity of task T3.So task T3 or task T2 is executed.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| T2 | T1 | T3 | T2 | Processor  idle | T2 | T3 |

0 2 5 6 8 10 12 13

**Ans 13)**(a) Possible, when a process is selected by the the short term scheduler.

(b)Not possible.

(c) Not possible

(d)Possible, when an I/O operation completes.

(e)Possible, when an I/O operation completes.

**Ans 14)** 5, 9, 12, 18(Shortest Job First).

**Ans 15)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| P | Q | R | S | T | P | R | T | P | R | P |

0 1 2 3 4 5 6 7 8 9 10 11

So , process P will finish at time 11.

**Ans 16)** The system is IO bound because the CPU burst is quite smaller, an average of 8ms.

Average user request needs 80+100ms=180ms.

So in 1 sec , number of user served is = 1000/180=5.5=5 users maximum.

If the disk is used 50% of the time then average user request is 80 + 50ms=130ms.

So, number of users serviced per second is =1000/130=7 users.

**Ans 17)**

|  |  |  |
| --- | --- | --- |
| **P1** | **P2** | **P3** |

**0 11 21 51**

1. 4 context switches.
2. 2 context switches.

**Ans 18)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| P3 | P2 | P3 | P2 | P3 | P1 | P2 | P3 | P1 | P2 | P3 |

0 4 5 6 7 8 9 10 11 12 13 14

Turn Around Time :

P1=12

P2=13

P3=14

Average Turn Around Time: 39/3=13.

**Ans 19) For P1:**

|  |  |  |
| --- | --- | --- |
| **I/O** | **CPU** | **I/O** |

**0 3 9 10**

**For P2:**

|  |  |  |  |
| --- | --- | --- | --- |
| **I/O** | **---------** | **CPU** | **I/O** |

**0 6 9 21 23**

**For P3:**

|  |  |  |  |
| --- | --- | --- | --- |
| **I/O** | **-------------------------** | **CPU** | **I/O** |

**0 9 21 39 42**

Therefore , CPU idle percentage is: (3+3/42)\*100=100/7=14.285%.

**Ans 20)** Compensation of time for lower level queues because using multilevel feedback queue will provide longer time to lower level queues as higher level queues have higher priority.this system provides fairer distribution of CPU time to the different kind of process.