

(8)

TCS-503

Process	Arrival Time	Burst Time
P1	0.000	4
P2	2.001	7
P3	3.001	2
P4	3.002	2

- (b) By using Round Robin Scheduling (Time Quanta = 2 ms), calculate the average completion time, average waiting time and average turnaround time for the following processes given in table below :

Process Id	Arrival Time	Burst Time
P1	0	4
P2	1	5
P3	2,	2
P4	3	1
P5	4	6
P6	6	3

- (c) Explain any five of the following :
Support you answer by giving suitable example

- Degree of Multi-programming
- Interrupt (Software and Hardware)
- Waiting time and Response time
- System call
- Bootstrap Program
- Dispatcher and Dispatch Latency

TCS-503

280

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Roll No.

TCS-503

B. TECH. (CS) (FIFTH SEMESTER) MID SEMESTER EXAMINATION, 2019

OPERATING SYSTEM

Time : 1 : 30 Hours

Maximum Marks : 50

Note : (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

Section—A

- Fill in the blanks : (1×5=5 Marks)
 - times is the very first time process hits the CPU.
 - The interval from the time of submission of a process to the time of completion is termed as
 - Swap in and Swap out is performed by
 - The number of processes the system can execute in a period of time is called
 - memory is assigned to a process in new state.

2. Attempt any five parts : (3×5=15 Marks)
- (a) For each of the following transitions between process states, indicate whether or not the transition is possible. If it is possible, give an example of one thing that would cause it :

- (i) Ready → Run
- (ii) Read → Swapped-Blocked
- (iii) Wait → Run
- (iv) Wait → Ready
- (v) Swapped Blocked → Swapped Ready
- (vi) New → Run

- (b) Explain the concept of Virtual Machine. Support your answer by giving an example of virtual machine which you use in day to day life.

- (c) What do you understand by the Context Switch ? Consider three CPU Intensive processes, which require 10, 20 and 30 time units and arrive at times 0, 2 and 6, respectively. How may context switches are needed if the OS implements a shortest remaining time first scheduling algorithm ? Do not count the Context Switch at time zero and at the end ?

- (ii) Average Response Time
(iii) Average Turn-around Time.

Process Id	Arrival Time	Burst Time	Priority
P1	0	4	2(LOW)
P2	1	2	4
P3	2	3	6
P4	3	5	10
P5	4	1	8
P6	5	4	12(HIGH)
P7	6	6	9

- (c) Differentiate between long-term scheduler, middle term scheduler and shortest term scheduler. Also, explain the role of Dispatcher.

5. Attempt any two parts of choice from (a), (b) and (c).
(5×2=10 Marks)

- (a) For the processes listed in table, draw a Gantt chart, illustrating their execution using :

- (i) First Come First Served
- (ii) Shortest Job First
- (iii) Shortest Remaining Time
- (iv) Round Robin (Time Quanta = 2)
- (v) Round Robin (Time Quanta = 1)

(6)

TCS-503

4. Attempt any two parts of choice from (a), (b) and (c).
(5×2=10 Marks)

- (a) There are 4 processes with process id P1, P2, P3 and P4.

The Burst time and Arrival time for all are given in table.

By using Shortest Job First algorithm (both for preemptive and non-preemptive), calculate the following :

- (i) Average Response Time
(ii) Average Waiting Time
(iii) Average Turn-around Time

Process	Arrival Time	Burst Time
P1	0.0	5.5
P2	0.5	6.5
P3	1.5	1.5
P4	2.5	3.5

- (b) There are 7 processes with process id P1, P2, P3, P4, P5, P6, P7. The relevant information for each is given in table given ahead. Priority based scheduling algorithm is used with preemption. Find out the following :

- (i) Average Waiting Time

(3)

TCS-503

- (d) Consider a system with 'n' CPU processors and 'm' processes, then answer the following queries regarding minimum and maximum number of processes :

	Minimum	Maximum
Ready	?	?
Running	?	?
Block	?	?

- (e) What do you understand by Multi-programming, Multi-tasking and Multi-processing Operating System ? Explain by giving suitable example for each.

```
(f) #include<stdio.h>
#include<sys/types>
int main( )
{
    if(fork() || fork())
        fork();
    return 0;
}
```

What will be the total number of child processes and parent process created for above program ? Explain by making a tree for it.

Section—B

3. Attempt any two parts of choice from (a), (b) and (c).
(5×2=10 Marks)

Process	Burst Time	Arrival Time	I/O Burst
P1	3, 6	0	7
P2	3, 1	1	8
P3	1, 1	2	8

- (a) Consider 3 processes P1, P2 and P3 with compute burst time as given in above table. Consider the First Come First Serve scheduling algorithm. Find out the Average Turn Around Time, Average Response Time, Average Waiting Time, Throughput and CPU Utilization.

- (b) How many processes would be generated after execution of this program ? Explain your answer by making a proper tree :

```
#include <stdio.h>
#include <unistd.h>
int main()
{ fork();
  fork() && fork() || fork();
```

```
fork();
printf("forked\n");
return 0;
```

```
}
```

- (c) By using multilevel queue scheduling technique calculate the completion time for each process, waiting time and turn around time. Also, draw the proper Gantt chart for the details of process given in table below. The priorities are assigned as system(High), Staff(2nd High), user (lowest). However, system uses round robin with $t_q = 1$ ms, staff uses FCFS and user uses round robin with $t_q = 4$ ms :

Process Id	Arrival Time	Burst Time	Type
P1	0	2	system
P2	1	1	system
P3	1	3	staff
P4	1	4	staff
P5	2	5	user