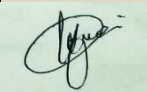


NAME OF STUDENT: Ali Imran ID No: 1074-2022

Assignment-3  
Spring 2024

Department / Faculty	Program	Semester	Course Title	Instructor	Issue Date	Due Date	Faculty Signature	Total Marks
FCIT	BSSE	4	Operating System	M.Irfan	28/05/2024	04/06/2024		6

**Instructions**

1. This paper contains **1 Questions**. Attempt all questions.
2. This quiz should be completed within the in assigned time, after the due time, quiz will not be accepted.
3. Please ensure that no part of your quiz should be copied from any resource.
4. The expected outcome of this assignment follows (C2, PLO-2, CLO-2)

***This table is for official use; do not write anything on it.***

CLOs	CLO_2		Total
Question Number	1		
Student's Score			
Maximum Score	6		

This paper has a total of **2 pages** including this title page

---

**NAME OF STUDENT:** Ali Imran **ID No:** 1074-2022

---

**Assignment # 3**  
**Spring 2024**  
**Operating System**

**Expected Outcome:**

**CLO2,PLO-2,C2:**

*Analyze and evaluate the algorithms of the core functions of the Operating Systems and explain the major performance issues with regard to the core functions*

**Total (6 marks)**

**Q1:** Analyze, evaluate and differentiate all scheduling algorithms given below and mention which scheduling algorithm is best for the given problem?

There are 7 processes P1 to P7. Their respective priorities, Arrival time, and Burst times are given below. Calculate TaT and WT ?

Process	Priority	Arrival Time	Burst Time
1	2 (H)	0	1
2	6	1	7
3	3	2	3
4	5	3	6
5	4	4	5
6	10(L)	5	15
7	9	15	8

- I. Non-preemptive FCFS
- II. Shortest Remaining Time First
- III. RR. Time quantum = 3
- IV. Priority Scheduling
- V. Longest Remaining Time First
- VI. Highest Response Ratio First

**Faculty of Computing and Information Technology (FCIT)**  
**Department of Computing Indus University, Karachi**

NAME OF STUDENT: Ali Imran

ID No: 1074-2022

**Assignment Date # 03**

Process	Priority	Arrival Time	Burst Time
1	2 (H)	0	1
2	6	1	7
3	3	2	3
4	5	3	6
5	4	4	5
6	10 (L)	5	15
7	9	15	8

**11)**

**NON PREEMPTIVE FCFS**

Arrival/Ready Queue

P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>	P <sub>6</sub>	P <sub>7</sub>
0	1	2	3	4	5	15

Running / Gantt Chart

P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	P <sub>4</sub>	P <sub>5</sub>	P <sub>6</sub>	P <sub>7</sub>
0	1	8	11	17	22	37

Process	Priority	Arrival Time	Burst Time	GT	Wait Time	Waiting Time
P <sub>1</sub>	2	0	1	1	1-0=1	1-1=0
P <sub>2</sub>	6	1	7	8	8-1=7	7-7=0
P <sub>3</sub>	3	2	3	11	11-2=9	9-3=6
P <sub>4</sub>	5	3	6	17	17-3=14	14-6=8
P <sub>5</sub>	4	4	5	22	22-4=18	18-5=13
P <sub>6</sub>	10	5	15	37	37-5=32	32-15=17
P <sub>7</sub>	9	15	8	45	45-15=30	30-8=22
<b>Total: 66</b>						

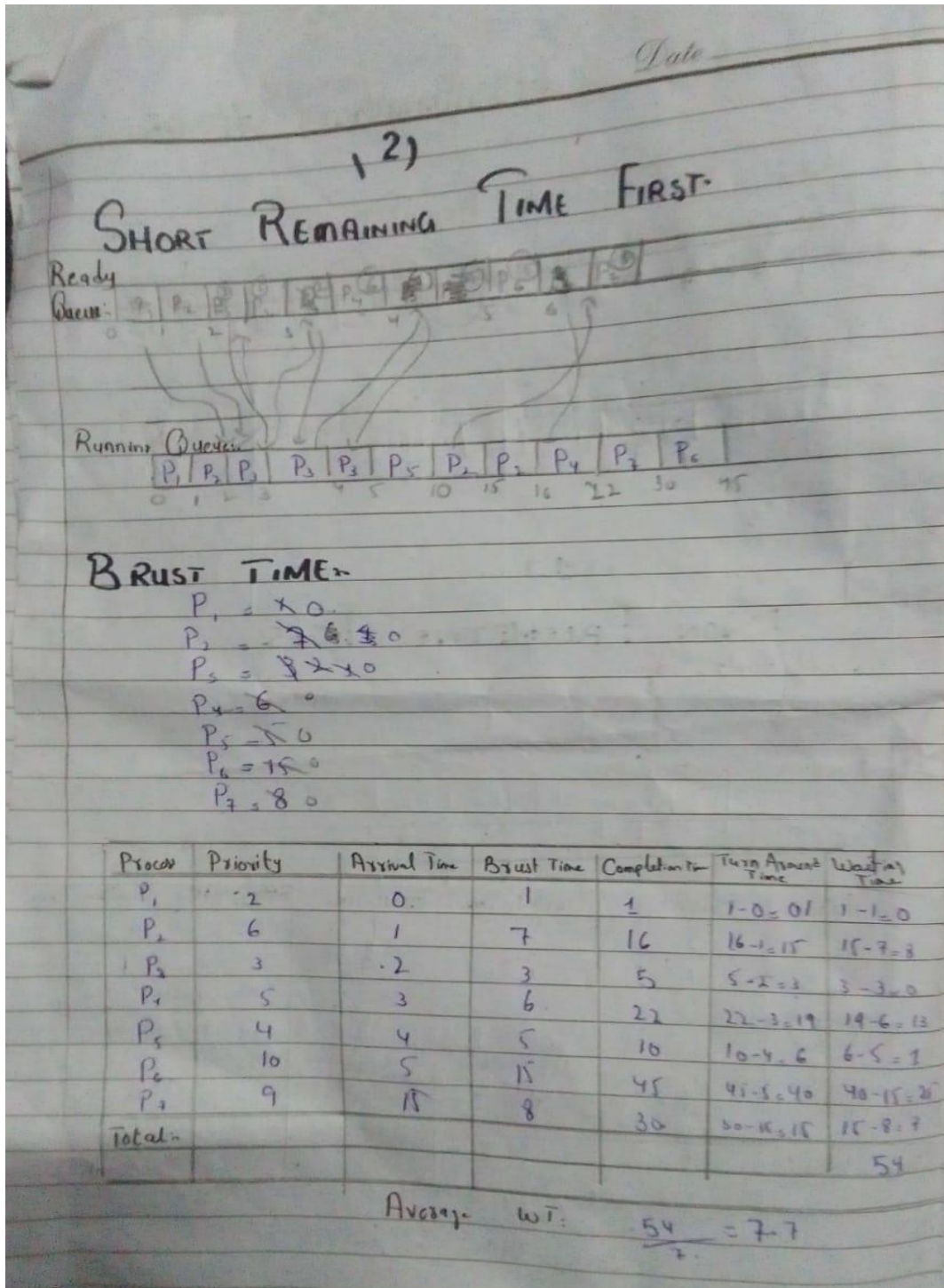
Average  $\frac{66}{7} = 9.42$

Page No. ☐ Teacher's Signature

**Faculty of Computing and Information Technology (FCIT)**  
**Department of Computing Indus University, Karachi**

NAME OF STUDENT: Ali Imran

ID No: 1074-2022





**Faculty of Computing and Information Technology (FCIT)**  
**Department of Computing Indus University, Karachi**

NAME OF STUDENT: Ali Imran

ID No: 1074-2022

Date \_\_\_\_\_

(3)

### Round Robin Time Quantum = 3

Ready Queue:  $P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8, P_9, P_{10}$

Running Queue:  $P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8, P_9, P_{10}$

**BURST TIME**

$P_1 = 10$   
 $P_2 = 40$   
 $P_3 = 20$   
 $P_4 = 20$   
 $P_5 = 20$   
 $P_6 = 20$   
 $P_7 = 20$   
 $P_8 = 20$   
 $P_9 = 20$   
 $P_{10} = 20$

Process	Priority	Arrival Time	Burst Time	Completion Time	TAT	Waiting Time
$P_1$	2	0	1	1	$1-0=1$	$1-1=0$
$P_2$	6	1	7	28	$28-1=27$	$27-7=20$
$P_3$	3	2	3	7	$7-2=5$	$5-3=2$
$P_4$	5	3	6	22	$22-3=19$	$19-6=13$
$P_5$	4	4	5	24	$24-4=20$	$20-5=15$
$P_6$	10	5	15	45	$45-5=40$	$40-15=25$
$P_7$	9	15	8	39	$39-15=24$	$24-8=16$
Total						91

Average waiting Time =  $\frac{91}{7} = 13$

**Faculty of Computing and Information Technology (FCIT)**  
**Department of Computing Indus University, Karachi**

NAME OF STUDENT: Ali Imran

ID No: 1074-2022

Date \_\_\_\_\_

### LONGEST REMAINING TIME FIRST.

Ready Queue

Running Queue

**BURST TIME:**

$P_1 = 10$   
 $P_2 = 7$   
 $P_3 = 3$   
 $P_4 = 8$   
 $P_5 = 5$   
 $P_6 = 15$   
 $P_7 = 9$

Process	Priority	Arrival Time	Burst Time	Completion Time	Waiting Time	WT
$P_1$	2	0	1	1	1-0=1	1-1=0
$P_2$	6	1	7	41	41-1=40	40-7=33
$P_3$	3	2	3	40	40-2=38	38-3=35
$P_4$	5	5	6	42	42-3=39	39-6=33
$P_5$	4	4	5	43	43-4=39	39-5=34
$P_6$	10	5	15	44	44-5=39	39-15=24
$P_7$	9	15	8	45	45-15=30	30-8=22
Total						181

Average waiting Time:  $\frac{181}{7} = 25.9$



**Faculty of Computing and Information Technology (FCIT)**  
**Department of Computing Indus University, Karachi**

NAME OF STUDENT: Ali Imran

ID No: 1074-2022

**Highest Response Ratio First**  
*(non Preemptive)*

Ready Queue:  $P_1, P_2, P_3, P_4, P_5, P_6, P_7$

Running Queue:  $P_1, P_2, P_3, P_5, P_4, P_7, P_6$

Taking Response Ratio After 8 sec.

$P_3 = \frac{(8-2)+3}{3} = 3$ $P_4 = \frac{(8-3)+6}{6} = 1.83$ $P_5 = \frac{(8-4)+5}{5} = 1.8$ $P_6 = \frac{(8-5)+5}{5} = 1.2$	$P_2 = \frac{(11-3)+6}{6} = 2.33$ $P_1 = \frac{(11-4)+5}{5} = 2.4$ $P_7 = \frac{(11-5)+5}{5} = 1.4$
---	---

$P_3$  will execute first

Taking RR after 16 sec.

$P_4 = \frac{(16-3)+6}{6} = 3.16$ $P_6 = \frac{(16-5)+5}{5} = 1.73$ $P_7 = \frac{(16-15)+8}{8} = 1.25$	$P_2 = \frac{(22-5)+5}{5} = 2.13$ $P_1 = \frac{(22-15)+8}{8} = 2.14$
--	---

$P_4$  will execute first among them

$P_7$  will execute first

Page No. ☐

Teacher's Signature

**Faculty of Computing and Information Technology (FCIT)**  
**Department of Computing Indus University, Karachi**

NAME OF STUDENT: Ali Imran

ID No: 1074-2022

Date \_\_\_\_\_

### Waiting Time Calculation:

Process	Priority	Arrival time	Burst Time	Completion time	TAT	WT
P <sub>1</sub>	2(H)	0	1	1	1-0=1	1-1=0
P <sub>2</sub>	6	1	7	8	8-1=7	7-7=0
P <sub>3</sub>	3	2	3	11	11-2=9	9-3=6
P <sub>4</sub>	5	3	6	22	22-3=19	19-6=13
P <sub>5</sub>	4	4	5	16	16-4=12	12-5=7
P <sub>6</sub>	10(L)	5	15	45	45-5=40	40-15=25
P <sub>7</sub>	9	15	8	30	30-15=15	15-8=7
Total						58

Average Waiting Time =  $\frac{58}{7} = 8.28$

### Average Waiting Time Of All Algorithm

Algorithms	Average Waiting Time
FCFS	9.42
Short Remaining Time First	7.7
Round Robin	13
Priority Scheduling.	7.7
Longest Remaining Time First	25.8
Highest Response Ratio first (Non preemptive)	8.28

According to given data/problem both short remaining time first and Priority Scheduling both are suitable, because both have least average waiting time of 7.7 amongst all.

Teacher's Signature \_\_\_\_\_