

Total No. of Questions: 6

Total No. of Printed Pages: 3

Enrollment No.....



Faculty of Engineering
End Sem Examination May-2023
IT3CO21 Operating System

Programme: B.Tech.

Branch/Specialisation: IT

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

- Q.1 i. The instructions like MOV or ADD are called as _____. 1
(a) OP-Code (b) Operators (c) Commands (d) None of these
- ii. Which of the type of OS reads and reacts in terms of actual time? 1
(a) Quick sharing OS (b) Time Sharing OS
(c) Real time OS (d) Batch OS
- iii. With round robin scheduling algorithm in a time shared system _____. 1
(a) Using very large time slices converts it into First come First served scheduling algorithm.
(b) Using very small time slices converts it into First come First served scheduling algorithm.
(c) Using extremely small time slices increases performance.
(d) Using very small time slices converts it into Shortest Job First algorithm
- iv. A system is in the safe state if _____. 1
(a) The system can allocate resources to each process in some order and still avoid a deadlock
(b) There exist a safe sequence
(c) Both (a) and (b)
(d) None of these
- v. Logical memory is broken into blocks of the same size called _____. 1
(a) Frames (b) Pages (c) Backing store (d) None of these

P.T.O.

[2]

- vi. The offset 'd' of the logical address must be _____. 1
 (a) Greater than segment limit
 (b) Between 0 and segment limit
 (c) Between 0 and the segment number
 (d) Greater than the segment number
- vii. Effective access time is directly proportional to _____. 1
 (a) Page-fault rate (b) Hit ratio
 (c) Memory access time (d) None of these
- viii. When using counters to implement LRU, we replace the page with the 1
 _____.
 (a) Smallest time value (b) Largest time value
 (c) Greatest size (d) None of these
- ix. The set of tracks that are at one arm position make up a _____. 1
 (a) Magnetic disks (b) Electrical disks
 (c) Assemblies (d) Cylinders
- x. The operating system keeps a small table containing information about 1
 all open files called _____.
 (a) System table (b) Open-file table
 (c) File table (d) Directory table

- Q.2 i. Differentiate between interpreter and compiler. 2
 ii. What is buffering? Explain its purpose in operating system. 3
 iii. How does the distinction between kernel mode and user mode function 5
 as a basic form of protection system?
- OR iv. What are different types of operating system? Explain in detail. 5

- Q.3 i. Describe the two methods for deadlock recovery. 3
 ii. Consider the following data and calculate the average waiting time and 7
 average turnaround time by using round robin scheduling (Time
 quantum=5)

Process	BT
P1	21
P2	3
P3	6
P4	2

[3]

- OR iii. What do you mean by a critical section? Using Semaphores, write a 7
 solution to readers and writers problem that allows multiple readers but
 not multiple writers.

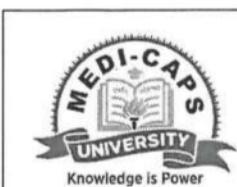
- Q.4 i. Differentiate between external and internal fragmentation. 3
 ii. What is segmentation? Explain virtual to physical address mapping in a 7
 segmented system with the help of a diagram.
- OR iii. Using bankers algorithm find- 7
 (a) How many resources of type A, B, C, D are there?
 (b) What are the content of Need Matrix?
 (c) Is the system in Safe state? If yes what is the safe sequence?

RESOURCE->	MAX				ALLOCATION	ALLOCATION
	A	B	C	D		
P0	6	0	1	2	4	0
P1	1	7	5	0	1	1
P2	2	3	5	6	1	2
P3	1	6	5	3	0	6
P4	1	6	5	6	0	2

- Q.5 i. Differentiate between virtual memory and cache memory. 4
 ii. Consider the following page reference string:
 7,0,1,2,0,3,0,4,2, 3,0,3,2,1,2,0,1,7,0,1,
 How many page faults would occur for the LRU and FIFO replacement
 algorithm assuming four available frames? All frames are initially empty.
- OR iii. What is the role of operating system in security? Explain security 6
 breaches.

- Q.6 Attempt any two:
 i. Consider a disk with 200 tracks and the queue has random requests from 5
 different processes in the order: 55, 58, 39, 18, 90, 160, 150, 38, and
 184. Initially arm is at 100. Find the average seek length using FIFO,
 LOOK algorithm.
 ii. What is directory? What are the different ways to implement a directory? 5
 iii. Explain file protection in LINUX. 5

Scheme of Marking



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Q.1	i)	A	1
	ii)	C	1
	iii)	A	1
	iv)	A C	1
	v)	B	1
	vi)	B	1
	vii)	A	1
	viii)	A	1
	ix)	D	1
	x)	B	1
Q.2	i.	4 differences each - 5	2
	ii.	Defination 2 marks Purpose 1 mark	3
	iii.	1 mark diagram 4 marks description	5
OR	iv.	Types 5 marks	5
Q.3	i.	2 methods 1.5 each	3
	ii.	Waiting time 3 marks, turnaround 3 marks	7
OR	iii.	Critical Section 3 marks Semaphore 4 marks	7
Q.4	i.	Critical Section difference 3 marks	3
	ii.	Segmentation 3 marks mapping 3 mark diag 7 marks	7
OR	iii.	(a) 2 marks (b) 2 marks (3) 3 marks	7
Q.5	i.	difference 4 marks	4
	ii.	LRU Page fault 3 marks FIFO 3 marks	6
OR	iii.	Role 3 marks , security breaches 3 marks	6
Q.6	i.	LruK 2.5 marks FIFO 2.5 marks	5
	ii.	2 marks directory, ways 3 marks	5
	iii.	file protection in Linux 5 marks	5

Q.3

12/5/II

Round	Robin	time	$q_4 = 5$
P1	BT 21	$32 - 0 = 32$	W.T (TAT - BT) $32 - 21 = 11$
P2	3	$8 - 0 = 8$	$8 - 3 = 5$
P3	6	$21 - 0 = 21$	$21 - 6 = 15$
P4	15	$15 - 0 = 15$	$15 - 2 = 13$

R.9

P1	P2	P3	P4	P1	P3	P1	P1	P1
0	5	8	13	15	20	21	26	31 32

$$AWT = \frac{11+5+15+13}{4} = 11$$

$$ATA = \frac{32+8+21+15}{4} = \frac{76}{4} = 19$$

Q.4

a) Resources of A = $4+1+1+3 = 9$ (ALLOCAT + Avail)

$$B = 1+2+6+2+2 = 13$$

$$C = 5+3+1+1 = 10$$

$$D = 1+4+3+2+1 = 11$$

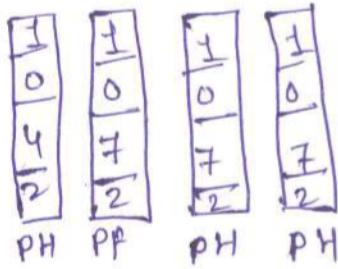
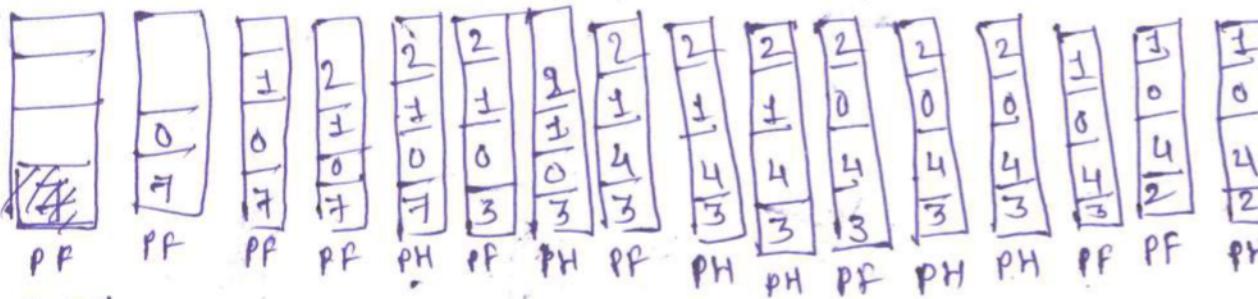
b) Need Matrix

Resource	A	B	C	D	Need Matrix (Max-allocation)
P0	2	0	1	1	3 2 1 1 P0-1
P1	0	6	5	0	5 2 2 2 - P2 (II)
P2	1	1	0	2	6 3 2 4 P3
P3	1	0	2	0	7 3 4 4 P4
P4	1	4	4	4	

safl state		New available				
	Need mat.	3	2	1	0	PO
P0	2 0 1 1	7	2	1	2	
P1	0 6 5 0					P2
P2	1 1 0 2	8	7	6	5	
P3	1 0 2 0	8	10	9	9	P3
P4	1 4 4 4	8	12	10	11	P4
		9	13	10	11	P1
			P0	P2	P3	P4

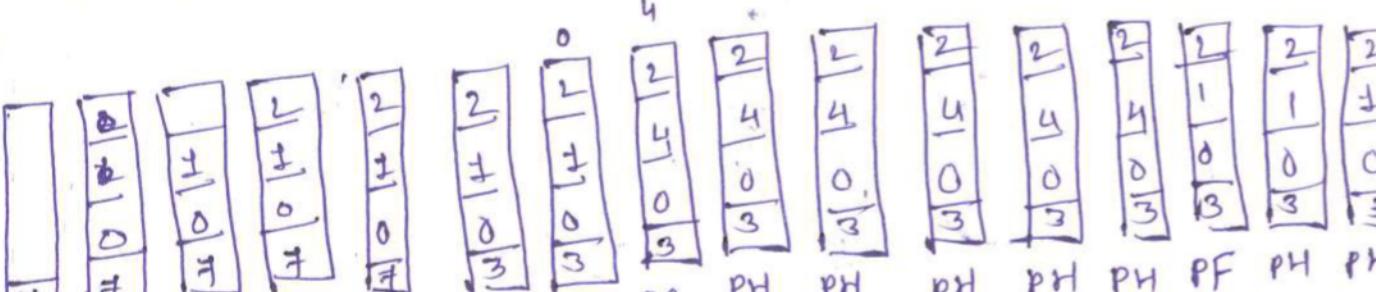
Q.5) Σ 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

FIFO



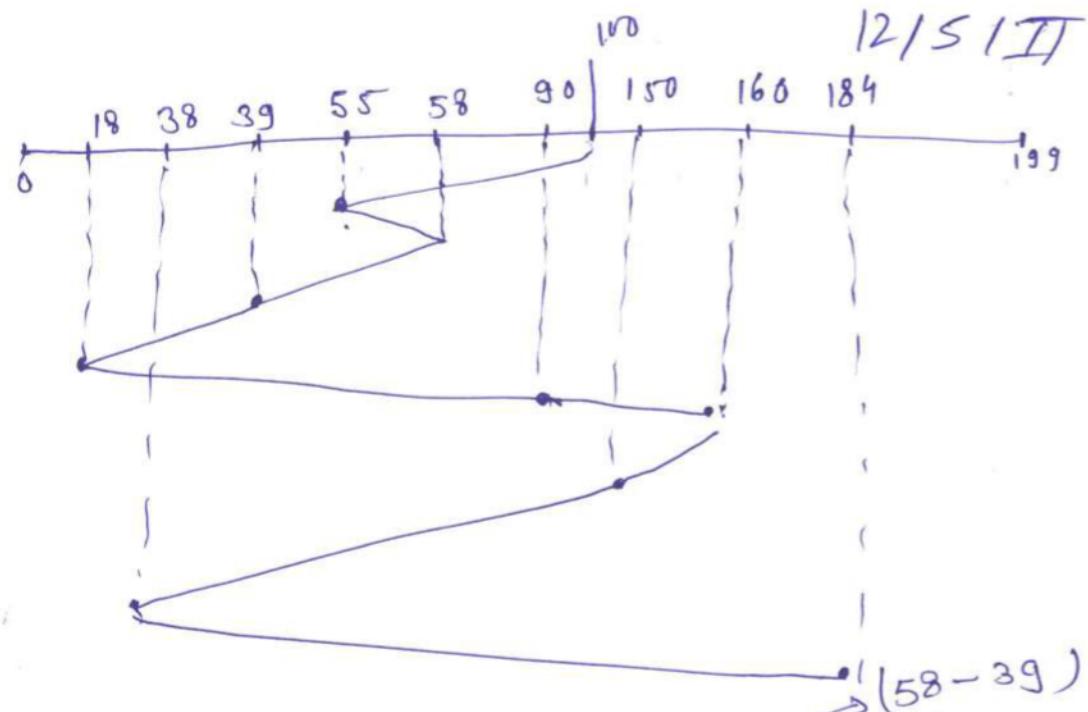
$$\begin{aligned} \text{Page fault} &= 10 \\ \text{Page Hit} &= 40 \end{aligned}$$

LRU



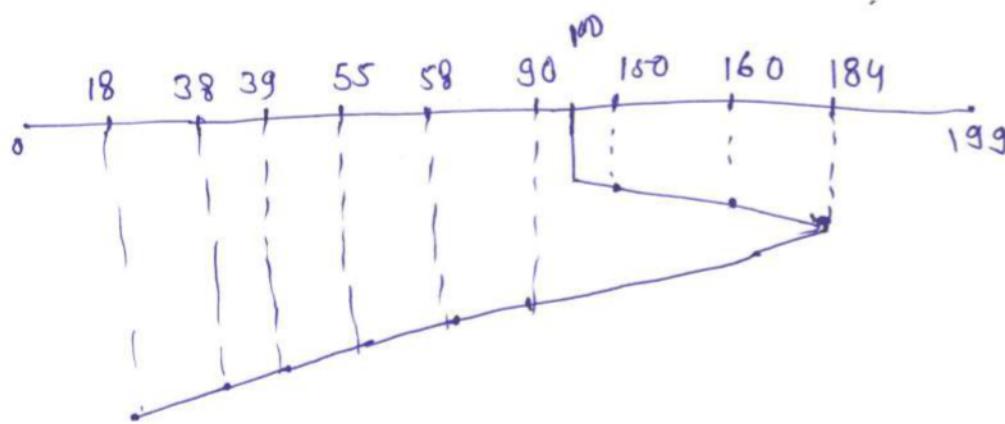
A.G

PIPQ



$$\begin{aligned}
 \text{Total seek time} &= (100 - 55) + (58 - 55) + (39 - 18) + (90 - 18) \\
 &\quad (160 - 90) + (150 - 38) + (184 - 38) \\
 &\quad + (160 - 150) \\
 &= 45 + 3 + 19 + 21 + 72 + 70 + 10 + 12 + 146 \\
 &= 508 - 10 = \underline{\underline{498}} = \textcircled{498} \text{ Answer}
 \end{aligned}$$

LOOK



$$\begin{aligned}
 \text{Total seek time} &= (150 - 100) + (160 - 150) + (184 - 160) + (184 - 90) + (90 - 51) \\
 &\quad (58 - 55) + (55 - 39) + (39 - 38) + (38 - 18) \\
 &= 50 + 10 + 24 + 94 + 32 + 3 + 16 + 1 + 20 \\
 &= \underline{\underline{250}}
 \end{aligned}$$

Q.6 i) FIFO

