Chhatrapati Shahu Ji Maharaj
University, Kanpur

Answer Script Details
Barcode 10009260

Roll No. 23071002365
Total Mark 67/75.00

Exam BACHELOR OF COMPUTER APPLICATIONS_ODD EXA
Subject BCA3003 - OPERATING SYSTEM

Question wise Mark Summary

Q.No	Mark	Q.No	Mark	Q.No	Mark	Q.No	Mark
1A	4/5	6A	7/7				
1B	5/5	6B	6/7				
1C	4/5	7A	NA/7				
1D	5/5	7B	NA/7				
1E	4/5	8A	NA/7				
1F	5/5	8B	NA/7				
1G	4/5	9	NA/15				
1H	5/5						
1I	4/5						
2A	NA/5						
2B	NA/5						
2C	NA/5						
3A	NA/7						
3B	NA/7						
4A	7/7						
4B	7/7						
5	NA/15						

Chhatrapati Shahu Ji Maharaj University
Kanpur, Uttar Pradesh

Date of Exam: 5/01/2025 Room No. G-13 Afternoon
Paper Code: BCA3003 Subject: Operating System Year/Sem. III rd
Name of Candidate: Khyati Trivedi
Roll No. 2307100236 5

COE Facsimile

Signature of Invigilator

Khyati Trivedi
Signature of Candidate

PART-II

MARKS OBTAINED										
Q.	1	2	3	4	5	6	7	8	9	10
(a)										
(b)										
(c)										
(d)										
(e)										
(f)										
(g)										
(h)										
(i)										
(j)										
Total										
Total Marks in Figures									Max. Marks	
Total Marks in Words										

Paper Code

Signature of Evaluator

PART-III

Course: Bachelor of Computer Application
Session: 2024-2025 Year/Semester: IIIrd Sem
Subject: Operating System

Paper Code: BCA3003

Exam Date: 03/01/2025

Name of Candidate: KHYATI TRIVEDI

Father's Name: S K TRIVEDI

महाविद्यालय का कोड College Code: KN162

परीक्षा केन्द्र का कोड Exam Centre Code: KN162

परीक्षा का प्रकार Type of Exam: Regular ● Ex. Student ○ Private ○ Back paper Exam ○

ANSWER BOOKLET NO.: 10009260

Paper Code: BCA3003

PART-IV

Enrollment Number: CSJMA230000129517

Candidate's Roll Number: 2307100236 5

Paper Code: 3003

Khyati Trivedi
Signature of Candidate

Signature of Invigilator

CSJMA

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नोट : 1. परीक्षार्थी को निर्देशित किया जाता है कि आवरण पत्रों के मुख भाग पर अंकित सभी निर्देशों को सावधानी पूर्वक पढ़ें।
2. बॉक्स में भरी जाने वाली प्रविष्टियाँ काली स्याही से भरें। 3. गोलों को काले या नीले बॉलपेन से भरा जाये।

INSTRUCTIONS TO THE CANDIDATE FOR FILLING PART-I

1. Read the instructions carefully given on the answer script and admit card.
2. Write Date of Exam, Shift, Paper Code & Name of Subject Correctly.
3. Write Name & Roll No. Correctly.
4. Write Semester & Branch Correctly.

INSTRUCTIONS TO THE CANDIDATE FOR FILLING PART-III

1. Use blue or black ball point pen for writing alphabets & numerals in ☐ Boxes.
2. Carefully study the example before you start marking.
3. As shown in the example below blacken the circles completely.

4. Make no Stray marks on this sheet.
5. **DO NOT WRITE OR MARK ON THE BAR CODE.**

IN ORDER TO AVOID UFM (UNFAIR MEANS) :

1. The Roll No. and Answer Book no. found elsewhere or any other symbol found in the answer book will be treated as unfair means.
2. Any tempering of Bar Code and Booklet no shall be treated as Unfair Means.
3. Do Not bring the materials like slip of paper/mobile/digital diaries/ study material/ revision notes in examination hall. Possession of the mobiles/ digital diaries/ electronic watch and any other electronic gadget except memory less scientific calculator shall be considered as UFM case.
4. Do not keep or paste currency note in answer script it shall be consider as UFM.

अनुचित साधन से बचने हेतु:

1. उत्तर पुस्तिका के निर्देशित स्थान को छोड़कर अनुक्रमांक एवं उत्तरपुस्तिका का क्रमांक कहीं और न लिखें तथा कोई भी चिन्ह न बनावें क्योंकि यह अनुचित साधन प्रयोग की परिधि में आता है।
2. उत्तर पुस्तिका के बारकोड अथवा उत्तर पुस्तिका संख्या पर छेड़ करने पर अनुचित साधन प्रयोग माना जायेगा।
3. परीक्षा कक्ष में निम्न वस्तुएं साथ न लायें, जैसे लिखे हुए कागज के टुकड़े, मोबाईल, डिजिटल डायरी, कोपी, पुस्तक यह सभी वस्तुएं जो अनुचित साधन के अन्तर्गत आती है। केवल संबंधित प्रश्नपत्र में ही मेमोरी लैस साइंटफिक केल्कुलेटर ले जाने की अनुमन्यता होगी।
4. उत्तर पुस्तिकाओं में रुपये न रखें न ही उत्तर पुस्तिका में चिपकायें। ऐसा करना अनुचित साधन प्रयोग की परिधि में आता है।

परीक्षार्थी के लिए निर्देश

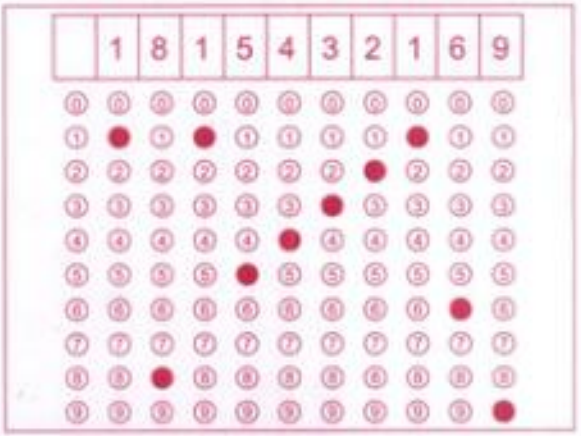
1. प्रवेश पत्र एवं उत्तर पुस्तिका पर दिये गये निर्देशों को ध्यान से पढ़ें।
2. कवर पृष्ठ के दूसरी तरफ कुछ न लिखें।
3. उत्तर पुस्तिका के पृष्ठों पर दोनों तरफ लिखें।
4. प्रश्न पत्र पर अपने अनुक्रमांक के अतिरिक्त कुछ न लिखें।
5. प्रश्न पत्र कोड एवं प्रश्न पत्र कोड सावधानी पूर्वक लिखें।
6. अपनी स्थिति स्पष्ट लिखें।
7. उत्तर पुस्तिका के पृष्ठों की संख्या देखें। अगर उत्तर पुस्तिका में पृष्ठ (1–24) से कम है या फटे हुए है, तो परीक्षा शुरू होने के पूर्व दूसरी उत्तर पुस्तिका ले लें।
8. प्रश्नपत्र को देख, यदि प्रश्नपत्र के विषय कोड, विषय का नाम तथा प्रश्न में कोई त्रुटि है तो उसके परीक्षा शुरू होने के 30 मिनट के अन्दर कक्ष निरीक्षक को तत्काल सूचित करें, उसके बाद विश्वविद्यालय द्वारा कोई कार्यवाही नहीं की जायेगी।
9. प्रश्नों के उत्तर लिखने के लिये पैंसिल का प्रयोग न करें।
10. B कोपी या अतिरिक्त ग्राफ नहीं दिया जायेगा।

INSTRUCTIONS TO THE CANDIDATE

1. Read the instructions carefully given on the Question Paper Admit Card & Answer Script.
2. Do not write anything on back side of the cover page.
3. Write on both sides of pages of answer book.
4. Do not write anything on question paper except Roll Number.
5. Write Paper Code & Question Paper Id carefully.
6. CHECK the number of pages (1-32) or any other kind of damage in your answer script, if found than change the answer script immediately before the commencement of examination.
7. CHECK the Question Paper for any kind of discrepancy e.g. Subject Code. Subject Name and Question of the Question Paper during first THIRTY MINUTES of the commencement of the exam, so that it can be corrected in TIME. After that no corrections shall be entertained by the university.
8. Do not use pencil for answering the question.
9. Write status correctly e.g. those appearing in carry over papers should fill in status as Carry Over. Those appearing as Ex-Students should fill in status as ex.
10. No supplementary answer book & graph paper will be provided.

INSTRUCTIONS TO THE CANDIDATE FOR FILLING PART-IV

1. Use blue or black ball point pen for writing alphabets & numberals in ☐ Boxes.
2. Use blue or black ball point pen for filling the circles.



Note - If your Roll No. is of 10 digits. Please leave first three columns

Paper Code

01

Section-A

a).		Batch processing OS.	Multiprogramming OS.
1.	Memory element	In batch operating system no memory element is included therfor the processor can only be assigned to a single task at time. & even if there is I/O wait the process will not switch to other process & execute the same process throughout.	In multiprogramming OS. there is a memory included. therfore more than one processes can be loaded into the main memory & executed in an interleaved manner. Therfore CPU can be allocated to multiple processes at a time in interleaved manner at time of I/O or waiting.
2.	Multi programming	A batch operating System does not support multi programming	It support multiprogramming because at a

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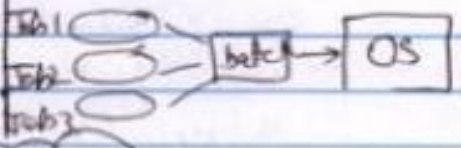
		because only a single job is given attention throughout the process.	time more than one processes are loaded into the main memory & they can be executed in an intuitive manner.
3.	Input-output devices.	Batch operating did not have a evolved user interface they use punch cards & Tape drives for input & output functions.	Multiprogramming O.S has a evolved OS and it has modern devices like keyboard & printers etc as input output devices.



b. System Call

- A System call is the interface between a user request and the hardware.
- A System call is made whenever a user makes a request for

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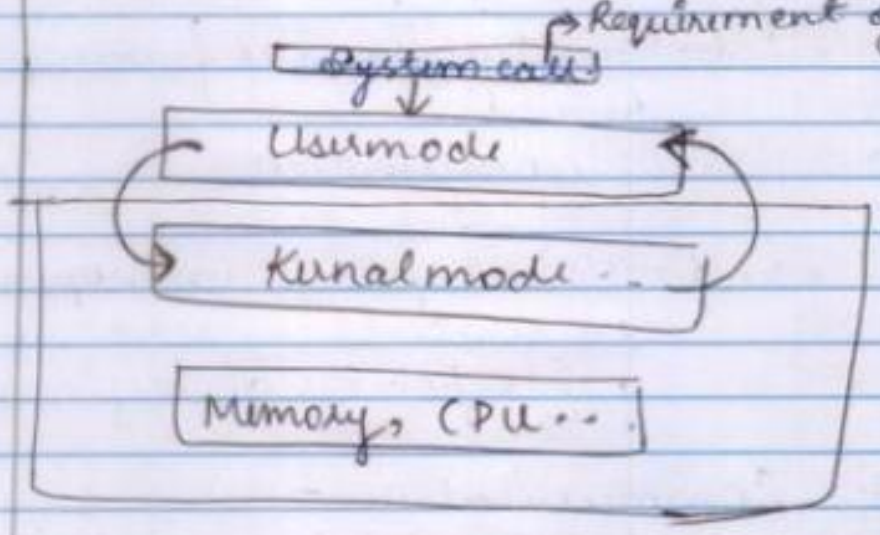
a priviledged task (task which is not normally available to user.

- whenever a system call is made the user mode switches to the Kernal mode then it satisfies the request and then again switch to the user mode.

- Execution of a System call.

1. User mode to Kernal mode
2. Satisfy the request
3. Kernal mode to User Mode back.



- A system call is made for standardization of services the user should make from the OS.

- System call also prevents the direct access to the devices which

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provides some security to the device from direct external use.

- It also provides abstraction of the core services of the OS from the outside world.
- A system call is very efficiently used in Time-sharing OS.

System call examples-

1. Process Management -
   - fork: This system call forms a new process
2. File Management
   - read - This system call opens a file to read & in read mode with pointer at beginning.
3. Communication -
   - mmap - This system call helps to map data in memory.

c. Convoy Effect

- Convoy Effect is a process in which the efficiency and performance of the CPU degrades because of a small process lagging behind a long & slow process
- This Effect usually ~~of~~ occurs in First-come-first-serve CPU(FCFS) algorithm because of no prumption and slow execution
- Whenever there is a slow and a long process which is taking a long time to get executed & also because of which the CPU performance is degrading then it is a process which leads to the convoy Effect.

Reasons of Convoy Effect.

1. Whenever inefficient algo like FCFS is used for a large number of process then convoy effect arises
2. Whenever there is no preemption & a long process does not leave the CPU until its complete execution then convoy effect is arised.

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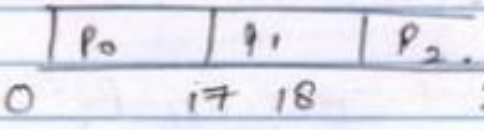
3. Whenever a single resource is used for a large number of tasks there is a probability of convoy Effect.

Example.

Process	Arrival time	Burst time
P_0	0	17
P_1	1	1
P_2	2	2

If we solve this CPU scheduling using FCFS algo then the first process P_0 will get executed & until it does not finish its execution it will not leave the CPU & the process P_1 & P_2 will have to wait for a long time despite having less Burst time which will affect the CPU performance.



Disadvantages of convoy Effect.

1. Due to this effect the average waiting time increases
2. The Response time also increases because of convoy effect.

Q.		Job Scheduling	CPU scheduling
1.	Definition	It is a Scheduler which brings the processes from the pool of executables (Job Queue) to the (Ready Queue)	This scheduler brings the process from the (Ready Queue) to (Running Queue)
2.	Objective	Its main objective is to submit the processes to the main memory for execution.	Its main objective is to enforce efficient scheduling algo & allocate & deallocate the CPU to the processes in the memory in an efficient manner.
3.	Another Name	It is also known as Long-Term Scheduler.	It is also known as Short-Term Scheduler.
4.	Frequency	It is less ~~pre~~ frequently used as compared to CPU scheduler.	It is more frequently used as compared to ~~CPU~~ Job

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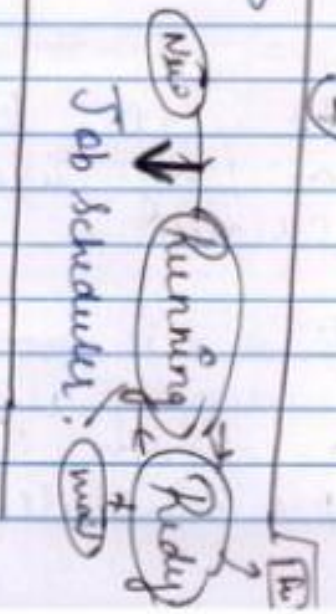
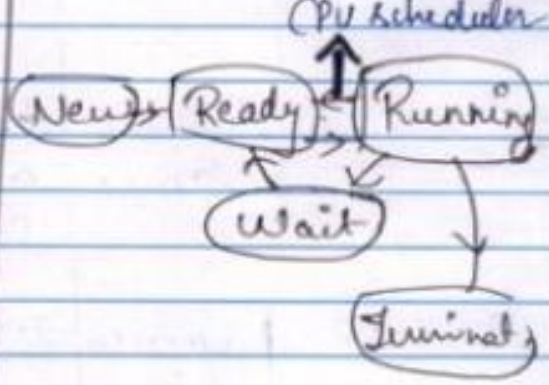
			Job scheduler because comparatively there are more processes in the ready Queue than the Job Queue.
5.	Multiprogramming.	It directly affects the multiprogramming of the system because how many jobs will be submitted is decided by Job scheduling.	It indirectly affects the multiprogramming because it only schedules the jobs which are already submitted by the Job scheduler.
6.	Positio		

		Turnaround Time	Completion Time
1.	Definition.	Turnaround Time is the complete time taken by a process from its submitted to served.	Completion time is time taken by a process to complete its execution after it is submitted.
2.	Formula.	It is derived from the formula - TT = C.T - AT CT = Completion Time AT = Arrival Time.	Completion Time is calculated by looking at the Gantt chart. The instance at which the process last got the CPU attention is its completion time.
3.	Purpose	It is used to monitor the overall performance	It is used to check only how much time does the

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		of the Scheduling Algorithm	process take to get executed.
4.	Depending	Turnaround Time always depends upon the completion time & Arrival Time.	Completion time is Indirectly depended on arrival otherwise it is independent
5.	Relation	If the completion Time of a task increases then definetly the TT will also increase TT ∝ CT	completion time is independent of the Turnaround Time because it is calculated prior the Turnaround Time.

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	Preemptive Scheduling	Non-Preemptive Scheduling.
1.	It is the process in which the CPU is forcefully switched to another process if there is a I/O or CPU bound job like Time Quantum	It is a process in which the CPU is never preempted throughout the execution of the program/process.
2.	The CPU time is interrupted according to the preset policies.	The CPU time is never interrupted throughout the burst time of the process.
3.	There is a frequent requirement of Context switching because the processes are allocated & deallocated the memory for a large number of times.	There is not a frequent requirement Context switching because no of switches is less as compared to the preemptive Scheduling.
4.	It is complex to maintain	It is simple and easy to establish

Paper Code

	and schedule.	and maintain.
5.	There is a large overhead of switching the CPU among the processes.	There is no such overhead
6.	In this algo the average waiting Time and Response time is comparatively less.	The average waiting time & Response time is high leading to bad performance.
7.	Examples — 1. Priority Scheduling 2. Round Robin (RR) 3. Shortest Remaining Job first (SRJF)	Examples — First Come First Served (FCFS) Shortest Job First (SJF)

Ans g. (Starvation)

- The starvation is a process where due to a bad scheduling Algorithm there is a number of processes which have been waiting for a resource for a large period of time.

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- Starvation usually occurs when a priority based Scheduling Algorithm is used and there is a deadlock because of same priority or there is contention for resource.
- A lower priority process always has to strive for the resource because high priority task come and utilize the resource leaving the lower priority process to starve.
- Starvation leads to a bad memory & CPU performance and also increases the average waiting time of a process.
- Starvation increases the average Response Time which proves the algorithm used as inefficient.

Reasons of Starvation.

1. Inefficient Scheduling:
When a priority scheduling is used for a number of varying burst time process starvation occurs.
2. Deadlock of blocked Processes.
Starvation occurs when there is a set of blocked process when the resources are blocked by multiple processes.

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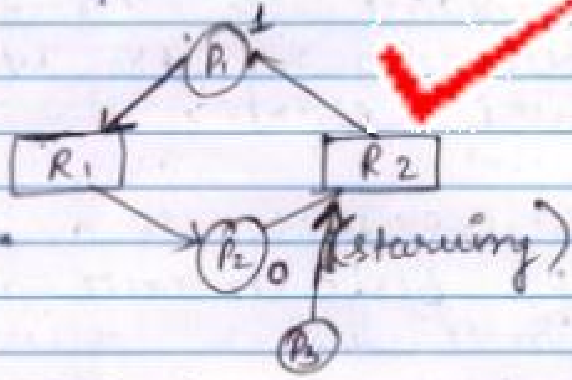
i.- Eg. Trade

- Single Instance.

When a single instance is used for multiple processes then deadlock occurs and starvation occurs for some processes.

k.

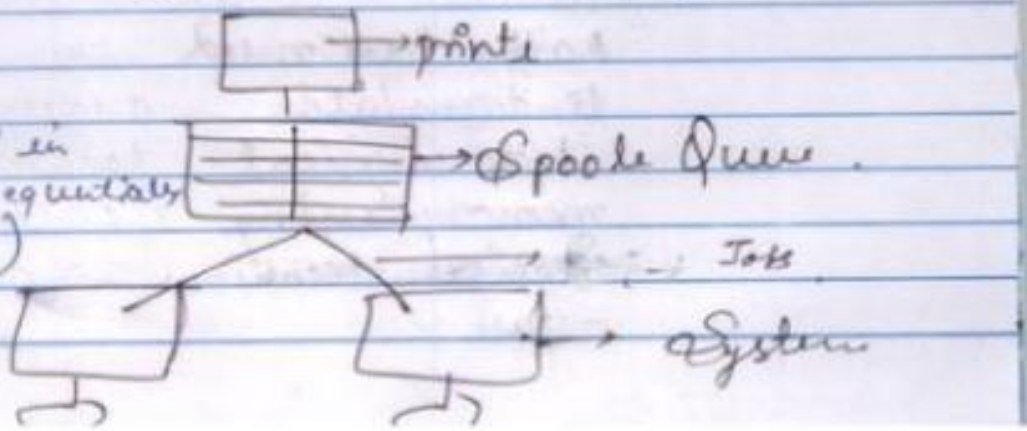


h. (Spooling) [Simultaneous Peripheral Operations Online]

- When there is a speed mismatch between two devices the concept of spooling is used.

- When a device is slow as compared to the CPU so the performance of CPU starts to get affected so to prevent that the CPU starts to send data instructions or information & these instructions are stored in a [illegible] memory for some time.

- Using this the slow devices keep on getting the Instruction or commands & store it in the queue and the CPU can perform its further process.
- Spooling ~~increases the degree of multi-programming~~ & this helps to convert ~~dedicated devices~~ into ~~shared devices~~ which can serve ~~more requests~~.
- Ex- There is a printer whose speed is very less as compared to CPU.
  CPU sends the data as input to printer, now CPU has to wait till the printer prints one job & then send another which decrease the performance but using spooling these commands can be stored in a Queue & the printer will one by one sequentially execute these jobs.



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	Logical Address	Physical Address.
1.	Also known as virtual address it is formed by the CPU during the compile time & it needs to be translated later.	It is a actual address of data in the storage device & it is formed by MMU (Memory Management Unit) by adding the value of Relocation Register to the logical address
2.	It is accessed by CPU & devices but there is no layer of abstraction in logical address as. It can't be directly accessed by the CPU therefore it does not provide safety to data	It is accessed by hardware or memory. but it is abstracted as you cannot directly access the physical Address first you need to translate the logical Address using various techniques & then you can have access to physical addres

Section-C

6. Dedicated device

- Dedicated Devices are the devices that can perform any one job at a time.
- Dedicated Devices are dedicated to the system and they can only serve a single a job or a single user throughout the time it is turned on.
- Examples of dedicated devices - Printer.
  It would not be a good idea to ~~s~~ have the instance of a dedicated device to more than one process because it would be awkward if your dedicat devices prints multiple contents of various users together giving rise to confusion.
- There is a single instance of a dedicated device & even if accidently there are more instances of the device they are all dedicated to a single user.

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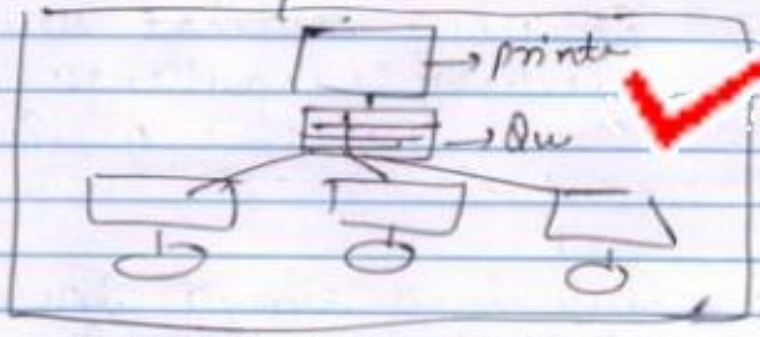
- Usually Dedicated devices are the personal devices which are meant to perform the tasks of a single user at a time.
- Multiprocessing & Multitasking is negligible in dedicated device. as it is meant to serve a single user only.
- A dedicated device can be converted into virtual device using spooling technique.
- If you give a spool queue to the printer which is a dedicated device then it will recieve as many requests from many users and serve them in a sequential manner.



A dedicated printer to a shared virtual printer using spooling.

Advantages of Dedicated Devices

1. They lack any confusion & complexity
2. Their memory management & resource management is easy & clear.
3. They are simpler to implement.

Disadvantages of Dedicated Devices.

1. Can serve only a single user at a time.
2. Can not perform multitasking.

b. When the memory to the blocks of a processes is assigned in a continuous fashion it is continuous Allocation.

Advantages of Continuous Allocation.

1. Continuous Allocation is simple to implement and there is no complex mapping required for continuous Allocated process.
2. Direct Access –
In continuous Allocation we can have

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direct acces to various media / data blocks if we know the starting point of the disk allocated to the process.

3. No overhead.
In contiguous Allocation, there is no any overhead of pointers indexes & we can easily traverse the whole process without the fear of loosing a pointer or a index.

Disadvantages of Contiguous Alloca.

1- ~~In first fit~~ External Fragmentation
In contiguous Allocation when memory blocks are allocated to process then there might be a space mismatch b/w the process size & memory block size so there are kept holes in the memory which lead to external fragmentation.

2- File cannot grow.

Contiguous allocation doesn't allow the files to grow or shrink dynamically & files

cannot expand as the memory blocks allocated are continous so expansion of file disturb the another adjacent block.

3. Wastage of Memory
In contiguous Allocation there is internal & external fragmentation bcoz memory is not allocated according to the size of the block so sometimes a small block can be Allocated a large memory block so the memory is wasted.

Section-5

Process No	Arrival Time	Burst Time
P_1	0	12
P_2	1	15
P_3	2	11
P_4	3	21

TQ = 4

Ready Queue.

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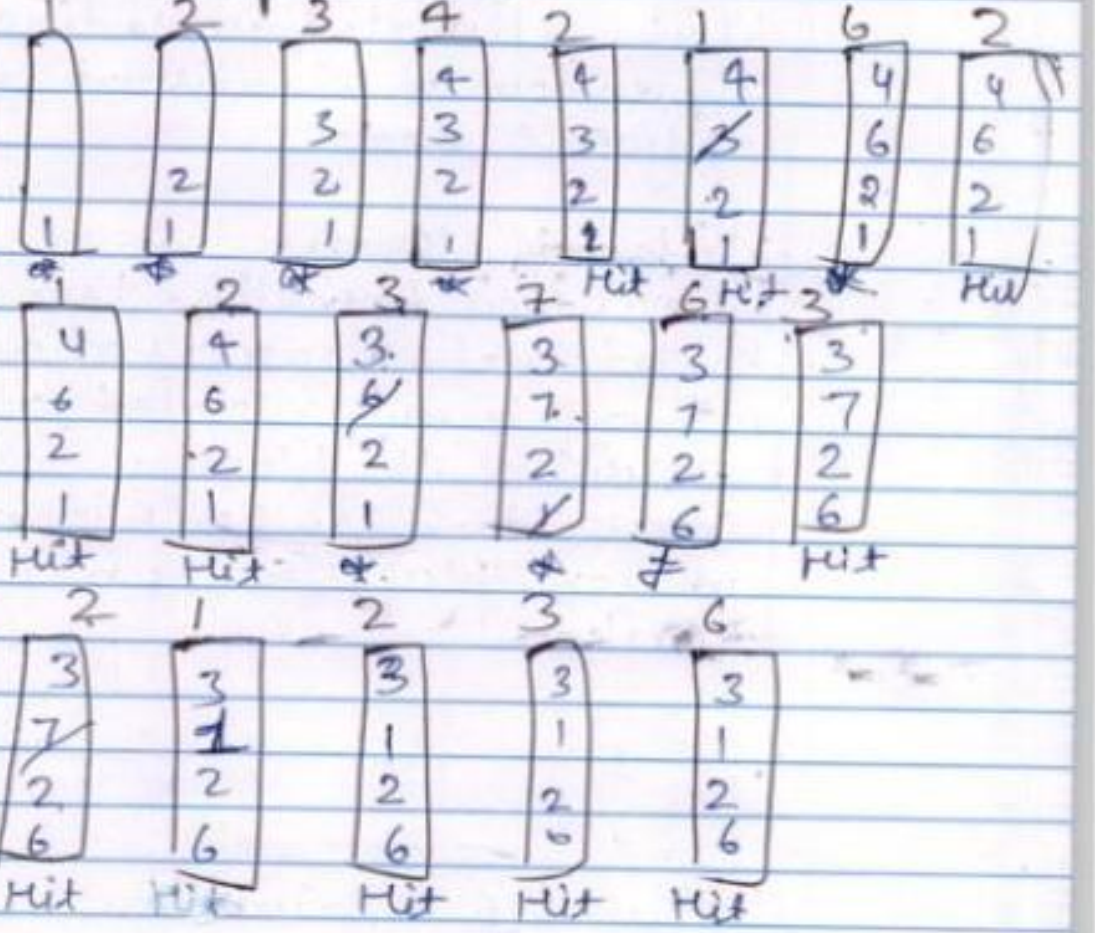
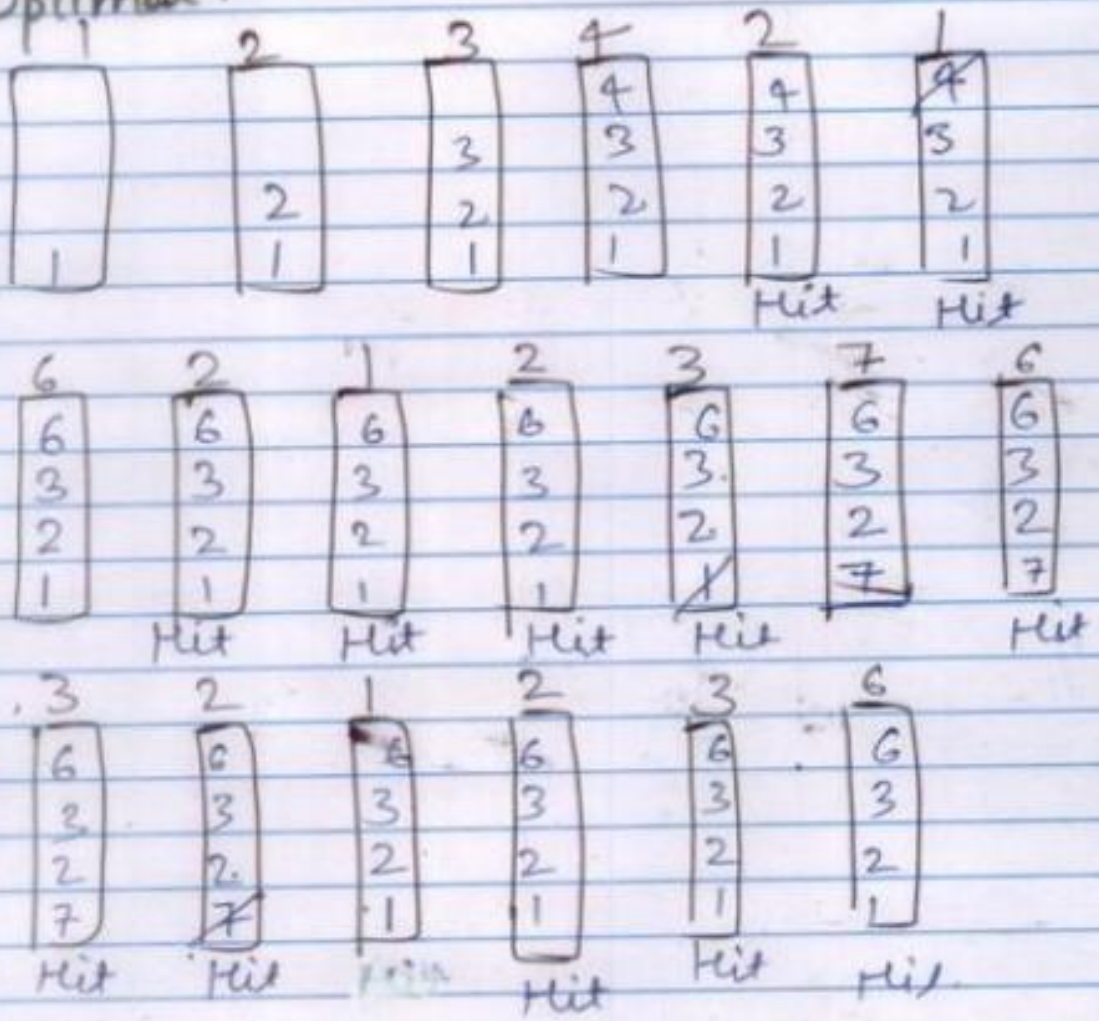
LRU Replacement



No. of page faults = 9

In this algorithm the least recently used pages are swapped out of the memory & only the recently used pages are included into the memory

Optimal.



No. of page faults = 7.

In this the future value is taken & the page which is least used in future is swapped out & new page is swapped in.

Paper Code

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