

Department of Computer Science

Gujarat University



Certificate

Roll No: 07

Seat No: _____

This is to certify that Mr./Ms. Lakshya V Chaudhary _____
student of MCA Semester – III has duly completed his/her term work for
the semester ending in December 2020, in the subject of
Operating System (OS) _____ towards partial fulfillment of
his/her Degree of Masters in Computer Applications.

Date of Submission
10 - December - 2020

Internal Faculty

Head of Department

Department Of Computer Science
Rollwala Computer Centre
Gujarat University

MCA - III

Subject: - Operating System (OS)

Name - Lakshya V Chuadharay

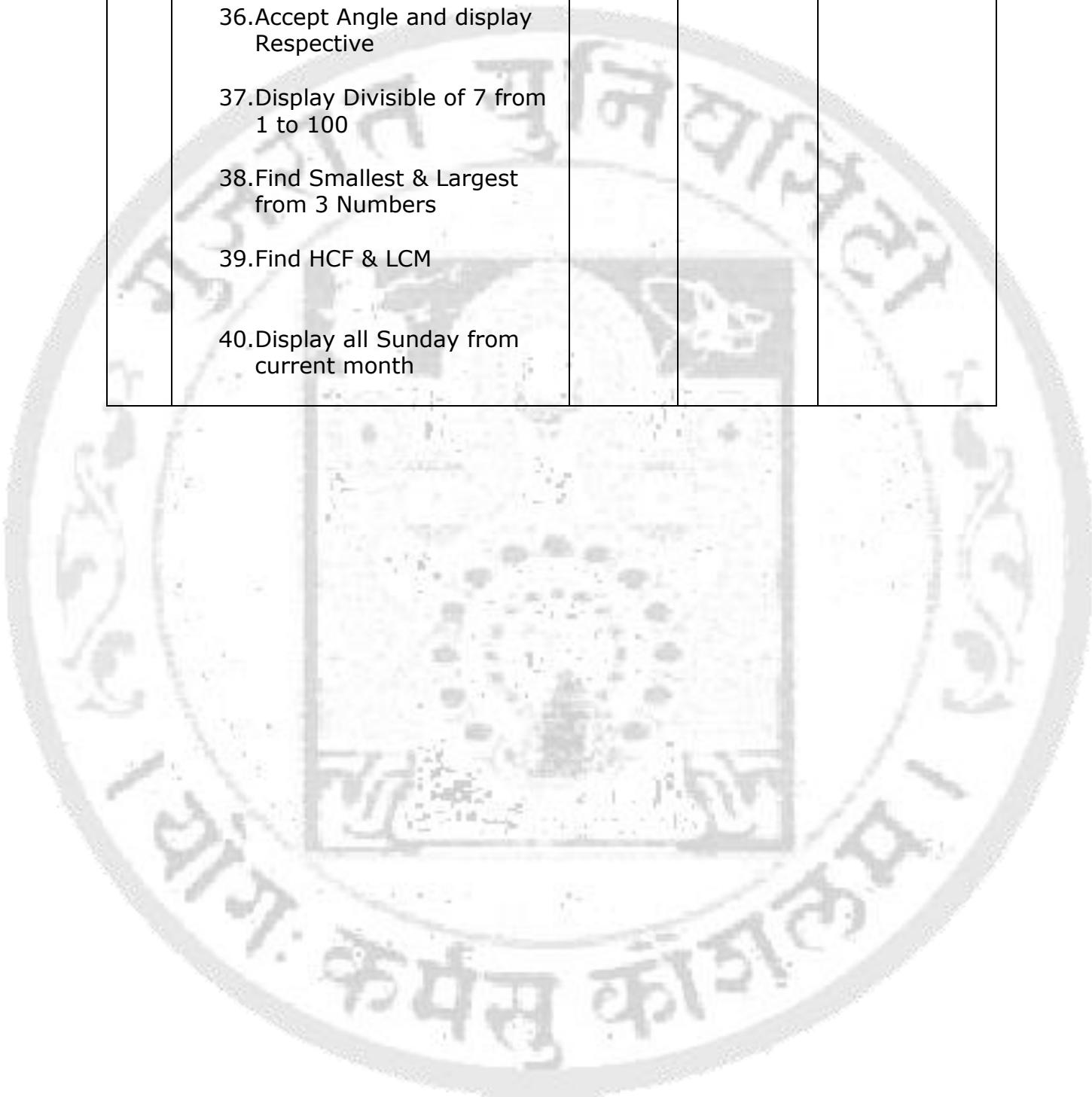
Roll No.: - 07

Exam Seat No.: - _____

Sr. No.	Contents	Pg. No	Date	Signature
1	Glossary		10-12-20	
2	Numericals		10-12-20	
3	Shell Scripts 1. Salary counter 2. Distance Finder 3. Area & perimeter 4. Calculate Digit Sum 5. Get information from /etc/passwd 6. Check File details 7. Get Profit or Loss 8. Odd or Even 9. Prime or Not 10. Leap Year or Not 11. Check 2 file are same or Not 12. ----Canceled--- 13. ----Canceled--- 14. Date Format 15. Display the Appropriate Message like Good Morning/Good Evening		10-12-20	

	<p>16.Display menu Driven Interface</p> <p>17.Menu Driven Calculator</p> <p>18.Factorials</p> <p>19.Fibonacci Series</p> <p>20.Input 2 number, find power using both numbers as base and exponent</p> <p>21.Use Similar to Head and Tail</p> <p>22.Display file name and size in descending order</p> <p>23. ---Cancelled---</p> <p>24.Prime number from 1 to 300</p> <p>25.Display combination of 1,2 & 3</p> <p>26.Rename file with shell PID as extension</p> <p>27.Find Occurrence of words from first file in rest of the files.</p> <p>28.Script delete occurrence of word "UNIX"</p> <p>29.Find Occurrence of "unix" word from every file.</p> <p>30.Script Receive file name as argument and copy file content such that file-1 copy to file-2, file-3 copy on file-4 so on.</p> <p>31.Display file which has execute permission</p> <p>32.Check if it's a file or directory</p> <p>33.Check the file name is exist if not then check</p>		
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	<p>"mydir" is exists or not.</p> <p>34.Calculate Percentage & Grade</p> <p>35.Armstrong Numbers</p> <p>36.Accept Angle and display Respective</p> <p>37.Display Divisible of 7 from 1 to 100</p> <p>38.Find Smallest & Largest from 3 Numbers</p> <p>39.Find HCF & LCM</p> <p>40.Display all Sunday from current month</p>		
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Operating System

Assignment.

- * Base address:- That address that is used as the origin in the calculation of address in execution of computer program.
- * Batch Processing:- Pertaining to the technique of executing a set of computer programs such that each is completed before the next program of set is started.
- * Binary Semaphore:- A Semaphore that takes on only the values 0 and 1. A binary semaphore allows only one process or thread to have access to shared critical resources at a time.
- * Block:
 - (1) A collection of contiguous records that are recorded as a unit; the unit are separated by interblock gap.
 - (2) A group of bits that are transmitted as a unit.
- * B-tree:- A technique for organizing indexes. In order to keep access time to a minimum, it stores the data keys in a balanced hierarchy that continually realigns itself as item are inserted and deleted.

*) Busy waiting: The repeated execution of a loop of code while waiting for an event to occur.

*) Cache memory :- A memory that is smaller and faster than main memory and that is interposed between the processor and main memory. The cache acts as a buffer for recently used memory location.

*) Central Processing Unit (CPU) That portion of a computer of a computer that fetches and executes instruction. It consists of an Arithmetic and logic units (ALU), a control unit and registers. often simply referred to as a processor.

*) Cluster :- A group of interconnected, whole computers working together as a unified computing resource that can create the illusion of being one machine. The term whole computer means a system that can run on its own, apart from cluster.

*) Concurrent :- Pertaining to process or thread that take place within a common interval of time during which they may have to alternatively share common resource.

*) Consumable resource: A resource that can be created and destroyed when a resource goes to exist. Examples of consumable resources are integers, signal, memory and information in I/O buffer.

*) Database: A collection of interrelated data, often with controlled redundancy, organized according to a schema to serve one or more applications. The data are stored so that they can be used by different programs without concern for the data structure or organization.

*) Deadlock: ① An impasse that occurs when multiple processes are waiting for the availability of a resource that will not become available because it is being held by another process that is in similar wait state ② An impasse that occurs when multiple processes are waiting for an action by or a response from another process that is in similar wait state.

*) Demand Paging: The transfer of a page from secondary memory to main memory storage at the moment of need. Compare prepaging.

- *) Device Driver: An operating system module that deals directly with a device or I/O module.
- *) Direct Access: The capability to obtain data from a storage device or to enter data into a storage device in a sequence independent of their relative position, by means of address that indicate the physical location of data.
- *) Direct memory Access (DMA) :- A form of I/O in which a special module called a DMA module, controls the exchange of data between main memory and an I/O device. The processor sends a request for transfer of a block of data to DMA module and it's interrupted only after the entire block transferred.
- *) Disable interrupt: A condition usually created by the operating system, during which the processor will ignore interrupt request signal of specific class.
- *) Disk allocation table: A table that indicates which blocks on secondary storage are free and available for allocation to files.

* Distributed operating system :- A common operating system shared by a network of computers. The distributed operating system provides support for interprocess communication, process migration, mutual exclusion, and the prevention or detection of deadlock.

* Dispatch :- To allocate time on a processor to jobs or task that are ready for execution.

* Enabled interrupt :- A condition, usually created by operating system, during which the processor will respond to interrupt request signals of a specified class.

* External fragmentation :- Occurs when memory is divided into variable size partitions corresponding to the block of data assigned to the memory. As segments are moved to and out of memory, gaps will occur between the occupied portion of memory.

* File :- A set of related record treated as a unit

* Field :- 1)Refined logical data that are part of a record. 2) The elementary unit of a record that may contain a data item, a data aggregate, a pointer, or a link.

- * File allocation Table :- (FAT) :- A table that indicates the physical location on secondary storage of space allocated to a file. There is a file allocation table for each file.
- * File management system :- A set of system software that provides services to users and application in the use of files, including file access, directory maintenance, and access control.
- * File organisation :- The physical order of record in a file, as determined by the access method used to store and retrieve them.
- * FCFS :- It is known as FIFO.
- * FIFO :- A queuing technique in which the next item to be retrieved is the item that has been in the queue for longest time.
- * Hash file :- A file in which records are accessed according to the values of a key field. Hashing is used to locate a record on the basis of its key value.
- * Hashing :- The selection of a storage location for an item of data by calculating the address as a function of contents of the data.

* Hit Ratio :- In a two-level memory, the fraction of all memory access that are found in the fast memory (e.g. the cache).

* Indexed Access :- Pertaining to the organization and accessing of the record of a storage structure through a separate index to the location of stored Record.

* Index file :- A file in which records are accessed according to the value of key fields. An index is required that indicates the location of each record on the basis of each key value.

* Index sequential Access :- Pertaining to the organization and accessing of the record of a storage structures through an index of keys that are stored in arbitrarily partitioned sequential files.

* Index sequential file :- A file in which records are ordered according to the values of a key field. The main file is supplemented with an index file that contains a partial list of keys values; the index provide a lookup capability to quickly reach the vicinity of a desired record.

- * Instruction cycle: The time period during which one instruction is fetched from memory and executed when a computer is given an instruction in machine language.
- * Internal fragmentation: Occurs when memory is divided into fixed-size partitions. If a block of data is assigned to one or more partitions, then there may be wasted space in the last partition. This will occur if the last portion of data is smaller than the last partition.
- * interrupt: A suspension of a process, such as the execution of a computer program, caused by an event external to that process and performed in such a way that the process can be resumed.
- * Interrupt handler: A routine, generally part of operating system, when an interrupt occurs, control is transferred to the corresponding interrupt handler, which takes some action in response to condition that cause the interrupt.
- * Job: A set of computational steps packaged to run as a unit.

- * Kernel :- A portion of operating system that includes the most heavily used portions of software. Generally, the kernel is running permanently in main memory. The Kernel runs in a privileged mode and respond to call from processes and interrupt from devices.
- * Kernel mode :- A privileged mode of execution reserved for a part of operating system. Typically, kernel mode allows access to region of main memory that are unavailable to processes execution in a less-privileged mode, and also enables execution of certain machine instruction that are restricted to the kernel mode. Also referred to as system mode or privileged mode.
- (*) LIFO :- A polling technique in which the next item to be retrieved is the item most recently placed in the queue.
- * Live lock :- A condition in which two or more process continuously change their state in response to change in the other process without doing any useful work. This is similar to deadlock in the no progress is made, but it differs in that neither process is blocked or waiting for anything.

4) Logical address: A reference to a memory location independent of the current assignment of data to memory. A translation must be made to a physical address before the memory access can be achieved.

5) Logical Record: A record independent of its physical environment portion of one logical record may be located in different physical record or several logical record or parts of logical record may be located in one physical record.

6) Main memory: Memory that is internal to that computer system, is program addressable, and can be loaded into registers for subsequent execution or processing.

7) Memory cycle time: The time it takes to read one word from or write one word to memory. This is the inverse of the rate at which word can be read from or written to memory.

8) Memory Partitioning: The subdividing of storage into independent sections.

9) Micro Kernel: A small privileged operating system core that provide process scheduling, memory management and communication services.

* Multiprocessing :- A mode of operation that provides for parallel processing by two or more processors that have common access to a main storage.

* Multiprogramming :- A mode of operation that provides for the interleaved execution of two or more computer programs by a single processor. The same as multitasking using different terminology.

* Multiprogramming load :- The number of processes that are partially or fully resident in main memory.

* Multitasking :- A mode of operation that provides for the concurrent performance or internal and external execution of two or more computer tasks. The same as multiprogramming using different terminology.

* Mutual exclusion :- A condition in which there is a set of processes only one of which is able to access a given resource or perform a given function at any time.

- * Operating System: Software that controls the execution of program and that provides service such as resource allocation, scheduling, input / output control, and data management.
- * Page: In virtual storage, a fixed-length block that has a virtual address and that is transferred as a unit between main memory and secondary memory.
- * Page fault: Occurs when the page containing the referred word is not in main memory. This causes an interrupt and requires that the proper page be brought into main memory.
- * Page frame: A fixed size contiguous block of main memory used to hold a page.
- * Paging: The transfer of pages between main memory and secondary memory.
- * Physical address: The absolute location of a unit of data in memory of - block or second, any memory, word or byte in main memory.
- * Pipe: A circular buffer allowing two processes to communicate on the producer-consumer model. Thus it is a first-in-first-out queue. Written by One.

* Preemption: Reclaiming a resource from a process before the process has finished using it.

* Prefraging: The retrieval of page other than the one demanded by a default page. The hope is that the additional page will be needed in the near future. Concurrent demand paging.

* Process: A program in execution. A Process is controlled and scheduled by operating system.

* Process control block: The manifestation of a process is an operating system. It is a data structure containing information about the characteristics and state of the process.

* Process State: all of the information that the operating system that needs to manage a process and that the process needs to properly execute the process. The process state includes the contents of the various processor registers, such as the program counter and data register. It also includes information of the operating system such as priority of the process.

* Processor: In a computer, a functional unit that interprets and executes instructions. A Processor consists of at least an instruction control unit and an arithmetic unit.

- * Program Counter: instruction address register.
- * Programmed I/O : A form of I/O in which the CPU issues an I/O command to an I/O module and must then wait for the operating to be complete before proceeding.
- * Real time system: An operating system that must schedule and manage real-time tasks.
- * Real time-task : A task that is executed in concert with other processes or functions on set of events external to the computer system and that must meet one or more deadlines to interact effectively and correctly with external environment.
- * Registers: High speed memory internal to the CPU. Some registers are user visible - that is available to the programmer via the machine instruction set. Other registers are used only by the CPU for control purposes.
- * Relative address : An address calculated as a displacement from a base address

* Response time :- In a data system, the elapsed time between the end of transmission of an enquiry message and the beginning of receipt of a response, measured at enquiry terminal.

* Round Robin :- A scheduling algorithm in which processes are activated in a fixed cyclic order, that is all processes are in a circular queue. A process that can not be proceed because it is waiting for not done event return to (on top) the scheduler.

* Scheduling :- To select job or task that are to be dispatched. In some operating system other unit of work, such as input/output operation, may be rescheduled.

* Secondary memory :- Memory located outside the computer system itself; that is it cannot be processed directly by the processor. It must first be copied into main memory.

* Segment :- In virtual memory, a block that has a virtual address. The block of a program may be of unequal length and may even be a dynamically varying length.

* Segmentation: The division of a program or application into the segment as part of a virtual memory scheme.

* Semaphore: An integer value used for signaling among processes. Only three operations may be performed only on semaphore, all of which are atomic: initialize, decrement, and increment. Depending on the exact definition of the semaphore, also known as counting semaphore or a general semaphore.

* sequential file: A file in which records are ordered according to the value of one or more key fields and processed in the same sequence from beginning of file.

* shell: The portion of the operating system that interprets interactive user commands and jobs control language command. It functions as an interface between the user and operating system.

* stack: An ordered list in which items are appended to and deleted from the top end to ~~bottom~~, known as the top. That is the next item appended to the list is put on the top and next time to be removed from the list is the item. This is method is characterized as last in first out.

- * Starvation: A condition in which a process is indefinitely delayed because other processes are always given preference.
- * Strong semaphore: A semaphore in which all processes waiting on the same semaphore are queued and will then fully proceed in some order as they executed the wait operation.
- * Swapping: A process that interchanges the content of an area of main storage with the content of an area in secondary memory.
- * SMP: A form of multiprocessor that allows the operating system to execute on any available processor or on several available processors simultaneously.
- * Synchronous Operation: An operation that occurs regularly or predictably with respect to the occurrence of specified event in another process. for ex. the calling of an input / output routine that receives control at a pre-coded location in a computer program.

* Synchronization: Situation in which two or more processes co-ordinate their activities based on condition.

* System bus: A bus used to interconnect major computer components.

* thread: A dispatchable unit of work. It includes a processor context and its own data area per a stack. A thread executes sequentially and is interruptible so that process can turn to another thread.

* Thread switching: The act of switching process control from one thread to another within the same process.

* Time sharing: The concurrent use of device by a number of users.

* Time slice: The maximum amount of time that process can execute before being interrupted.

* Trace: A sequence of instruction that are traced when a process is running.

* Trojan horse: Secret undocumented routine embedded within a useful program. Execution of program result in execution of secret routine.

- * User mode: The least-privileged mode of execution. Certain region of main memory and certain machine instruction cannot be used in this mode.
- * Virtual address: The address of storage location in virtual memory.
- * Virtual memory: - The storage space that may be regarded as addressable main storage by the user of a computer system, in which virtual address are mapped into real address.
- * Virus: Secret undocumented routine embedded within a useful program execution of program result in execution of the routine.
- * WDR Semaphore: A semaphore on which all process waiting on rare semaphore proceed in an unspecified order.
- * Word: An ordered set of bytes or bits that is the natural unit in which info is stored, transmitted or within computer.
- * Worm: Program that can travel from computer to computer across network connection. May contain a virus or bacteria.

OSBanker's Algorithm

CD

\Rightarrow Process	Allocation	MAX	Available	Need
	A B C	A B C	A B C	A B C
P ₀	1 5 3	7 5 3	3 3 2	
P ₁	0 1 0	3 2 2		
P ₂	2 0 0	9 0 2		
P ₃	3 0 2	2 2 2		
P ₄	2 1 1	4 3 3		
	0 0 2			

\rightarrow Process	Allocation	MAX	Need
	A B C	A B C	A B C
P ₀	0 1 0	7 5 3	7 4 3
P ₁	2 0 0	3 2 2	1 2 2
P ₂	3 0 2	9 0 2	6 0 0
P ₃	2 1 1	2 2 2	0 1 1
P ₄	0 0 2	4 3 3	4 3 1

\rightarrow Need \leq work \Rightarrow work = work + Allocation

P₀ 743 \leq 332 \leftarrow condition fail.

$$\begin{aligned}
 P_1 \quad 122 &\leq 332 \leftarrow \text{condition True} \\
 w &= \text{work} + \text{allocation} \\
 &= 332 + 200 \\
 &= 532
 \end{aligned}$$

P₂ Need \leq work

600 \leq 532 Condition false.

(2)

 $\Rightarrow P_3 \text{ Need} \leq \text{work}$

$$011 \leq 532$$

Condition True.

$$\begin{aligned} w &= \text{work} + \text{allocation} \\ &= 532 + 211 \\ &= \underline{\underline{743}} \end{aligned}$$

 $\Rightarrow P_4 \text{ Need} \leq \text{work}$

$$\begin{aligned} 431 &\leq 743 \Rightarrow w = \text{work} + \text{allocation} \\ &= 743 + 002 \\ &= \underline{\underline{745}} \end{aligned}$$

$$\begin{aligned} \Rightarrow P_0 \text{ Need} \leq \text{work} \Rightarrow \text{work} &= w + \text{allocation} \\ &= 745 + 010 \\ &= \underline{\underline{755}} \end{aligned}$$

$$\begin{aligned} \Rightarrow P_2 \text{ Need} \leq \text{work} \Rightarrow \text{work} &= w + \text{allocation} \\ 600 &\leq 755 = 755 + 302 \\ &= \underline{\underline{1057}} \end{aligned}$$

State sequence $\hookrightarrow \langle P_1, P_3, P_4, P_0, P_2 \rangle$

FIFO.

7, 0, 1, 2, 03, 0, 4, 2, 3, 0, 3, 03, 2, 1, 2, 0, 1, 2, 0, 1

7	0	1	2	0	3	0	4	2	3	0	3
7	7	7	7	2	2	2	4	4	4	4	0
6	0	0	0	0	3	3	3	2	2	2	2
1	1	1	1	0	0	0	0	0	3	3	3

(3)

3	2	1	2	0	1	3	0	1
		0	0			7	7	7
		1	1			1	0	0
		3	2			2	2	1

Page fault = 15

no of frame = 3

* LRU: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 0, 3, 0
 3, 2, 1, 2, 0, 1, 7, 0, 1

7	6	1	2	0	3	0	4	2	3	0	3
7	7	7	2	2	2	4	4	4	4	3	3
0	0	0	0	0	0	0	0	0	0	3	3
1	1	1	1	3	3	3	2	2	2	2	2

0	3	2	1	2	0	1	3	0
			1		1		1	
			3		0		0	
			2		2		7	

No of frame :- 3

Page fault = 12

* Optimal: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 0, 3, 2,
 1, 2, 0, 1, 7, 0, 1

(7)

7	0	1	2	0	3	0	4	2	3	0	3	0
7	7	7	2		2		2			2		
0	0	0	0		0		4			0		
1	1	1	1		3		3			3		
2										2		

2	1	2	0	1	7	0	1
		2			7		
		0			0		
		1			1		

No of frame :- 3
 Page fault = 9.

* FIFO :- 1, 3, 0, 3, 5, 6, 3

1	3	6	3	5	6	3
	1	3	3	5	5	5
	3	3	0	3	6	6
	0	0	0	0	0	3

Page fault = 6
 No of frames = 3

⇒ Optimal :- 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 3

7	0	1	2	0	3	0	4	2	3	0	3	2	3
7	7	7	2	3	3		3						
0	0	0	0	0	0		0						
1	1	1	1	1	1		4						
2				2	2		2						

Page fault = 6
 no of frames = 4.