



VTU Connect

Get Inspired, Give Inspiration

Best VTU Student Companion App You Can Get

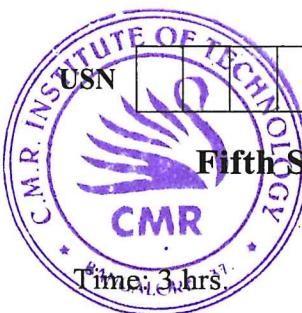
DOWNLOAD NOW AND GET

**Instant VTU Updates, Notes, Question Papers,
Previous Sem Results (CBCS), Class Rank, University Rank,
Time Table, Students Community, Chat Room and Many
More**

CLICK BELOW TO DOWNLOAD VTU CONNECT APP
IF YOU DON'T HAVE IT



* Visit <https://vtuconnect.in> for more info. For any queries or questions wrt our platform contact us at: support@vtuconnect.in



10CS53

Fifth Semester B.E. Degree Examination, July/August 2022

Operating Systems

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART – A

- 1 a. Define operating system. List and explain the services of operating systems. (08 Marks)
b. With a neat diagram, explain the concept of virtual machine. (08 Marks)
c. Explain system calls and system programs. (04 Marks)

 - 2 a. Define process. Explain different state of process with process state diagram. (08 Marks)
b. Explain different types of schedulers. Discuss the types of scheduling criteria used in operating system. (06 Marks)
c. For the following example, calculate the average waiting time and average turnaround time using FCFS.
- | Processes | Arrival time | Burst time |
|----------------|--------------|------------|
| P ₀ | 0 | 6 |
| P ₁ | 1 | 3 |
| P ₂ | 2 | 1 |
| P ₃ | 3 | 4 |
- (06 Marks)
- 3 a. What is critical section problem? Explain sempahore and monitor. (06 Marks)
b. Explain dining philosophers problem using monitors. (06 Marks)
c. What do you mean by RACE condition? Explain readers writers problem with semaphore. (08 Marks)

 - 4 a. What is deadlock? What are necessary condition in operating systems for a deadlock to occur? (05 Marks)
b. What are three different methods to handle deadlock? Also explain deadlock prevention and deadlock avoidance. (06 Marks)
c. For the following snapshot. Find the safe sequence using Banker's algorithm.

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P ₀	0	0	2	0	0	4	1	0	2
P ₁	1	0	0	2	0	1			
P ₂	1	3	5	1	3	7			
P ₃	6	3	2	8	4	2			
P ₄	1	4	3	1	5	7			

- Is the system in safe state?
 - If a request from process P₂ arrives for (0, 0, 2) can the request be granted immediately?
- (09 Marks)

10CS53

PART -B

- 5 a. Define locality of reference? Difference between paging and segmentation. (06 Marks)
b. What is transition look Aside Buffer? Explain TLB in detail with a simple paging system With a neat diagram. (08 Marks)
c. Consider the following reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 using FIFO replacement algorithm find the number of page fault [no of frames = 3]. (06 Marks)
- 6 a. What is file? Explain allocation methods of file. (06 Marks)
b. Explain different access methods. (08 Marks)
c. What is directory? List the different type of directories and explain any two directories structure with example. (06 Marks)
- 7 a. What is disk scheduling? Discuss different disk scheduling techniques. (12 Marks)
b. Explain capability lists methods of implementing access matrix. (08 Marks)
- 8 a. Explain the different system components of Linux operating system. (10 Marks)
b. Explain the different IPC mechanism available in Linux. (10 Marks)

**CMRIT LIBRARY
BANGALORE - 560 037**

* * * * *

USN

--	--	--	--	--	--	--	--

10CS53



Fifth Semester B.E. Degree Examination, Feb./Mar. 2022

Operating Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

1. a. What is meant by a System Call? Briefly describe any 4 types of System Calls. (10 Marks)
b. Define Operating System. List and explain briefly any four services provided by an Operating System. (10 Marks)

2. a. How do threads differ from processes? Describe the different Threading models. (10 Marks)
b. Suppose that the following processes arrive for execution at the times indicated. Each process will run the listed amount of time. In answering the questions, use non-preemptive scheduling and base all decisions on the information you have at the time the decision must be made.

Process	Arrival Time	Burst Time
P ₁	0.0	8
P ₂	0.4	4
P ₃	1.0	1

- i) What is the Average turnaround time for these processes with the FCFS scheduling algorithm?
ii) What is the Average turnaround time for these processes with the SJF scheduling algorithm? (10 Marks)

3. a. Define Critical-section problem with a general structure of a process. Explain the different requirements to solve the critical section problem. (10 Marks)
b. What is meant by Process Synchronization? Briefly discuss the classic problems of Process Synchronization. (10 Marks)

4. a. List briefly the methods to recover from the deadlocks.
b. Consider the following snapshot of a system : (05 Marks)

	Allocation			
	A	B	C	D
P ₀	0	0	1	2
P ₁	1	0	0	0
P ₂	1	3	5	4
P ₃	0	6	3	2
P ₄	0	0	1	4

Allocation

	MAX			
	A	B	C	D
P ₀	0	0	1	2
P ₁	1	7	5	0
P ₂	2	3	5	6
P ₃	0	6	5	2
P ₄	0	6	5	6

	Available			
	A	B	C	D
P ₀	1	5	2	0
P ₁				
P ₂				
P ₃				
P ₄				

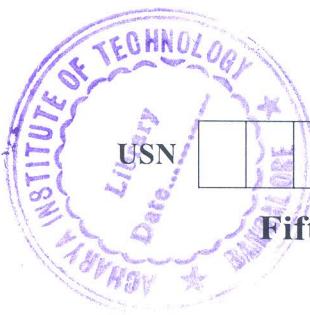
Answer the following using the Banker's algorithm :

- i) What is the content of the matrix need?
- ii) Is the system in a Safe state? (06 Marks)
- c. Describe about Monitors. Provide a monitor solution to the Dining – Philosopher problem. (09 Marks)

PART - B

- 5 a. When do a Page fault occurs? Draw and describe the steps involved in handling a page fault. (10 Marks)
- b. Explain the different factors considered in comparing different Memory Management Strategies. (10 Marks)
- 6 a. Describe in detail about Directory Structure and any four operations that are performed on a directory. (07 Marks)
- b. Consider a system that supports 5000 users. Suppose that you want to allow 4990 of these users to be able to access one file.
- i) How would you specify this protection scheme in UNIX?
 - ii) Could you suggest another protection scheme that could be used more effectively for this purpose than the scheme provided by UNIX?
- c. Draw and describe the file allocation table. (06 Marks)
- 7 a. Suppose that a disk drive has 5000 cylinders , numbered 0 to 4999. The drive is currently serving a request at cylinder 143 and the previous request was at cylinder 125. The queue of pending requests in FIFO order is
86, 1470 , 913 , 1774 , 948 , 1509 , 1022 , 1750 , 130
Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk scheduling algorithms?
i) FCFS ii) SSTF iii) SCAN iv) LOOK v) C – SCAN. (10 Marks)
- b. What is Access Matrix? Discuss the access matrix with copy rights and owner rights. (10 Marks)
- 8 a. Discuss the design goals for Microsoft Windows XP. (10 Marks)
- b. What is Slab Allocation? Discuss the Slab allocation in Linux Operating System. (10 Marks)

CMRIT LIBRARY
BANGALORE - 560 037



USN

--	--	--	--	--	--	--

10CS53

Fifth Semester B.E. Degree Examination, July/August 2021

Operating Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. What is an Operating Systems? Explain the abstract view of system components. (08 Marks)
b. What is real time system? Describe two different types of real time system. (04 Marks)
c. Describe the different computing environments. (08 Marks)

- 2 a. What is a process? Explain process state and PCB using diagrams. (08 Marks)
b. For the following set of processes, calculate average turnaround time and average waiting time for the following algorithms:
(i) FCFS (ii) Preemptive SJF (iii) Round Robin (Time quantum = 1 ms)

Process	Arrival Time	Burst Time
P ₁	0	8
P ₂	1	4
P ₃	2	9
P ₄	3	5

(12 Marks)

- 3 a. What is critical section problem? Explain Peterson's solution for it. (10 Marks)
b. Discuss about Dining Philosopher's (DP) problem. Give the solution for DP using monitors. (10 Marks)

- 4 a. What is Deadlock? Explain the different conditions hold in a system for deadlock. (05 Marks)
b. Explain Resource-Allocation-Graph algorithm for deadlock avoidance. (05 Marks)
c. The OS contains 3 resources, the number of instance of each resource type are 7, 7, 10. The current resource allocation state is shown below:

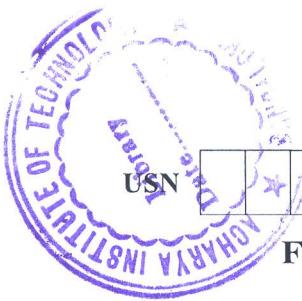
Process	Current Allocation			Maximum Need		
	R ₁	R ₂	R ₃	R ₁	R ₂	R ₃
P ₁	2	2	3	3	6	8
P ₂	2	0	3	4	3	3
P ₃	1	2	4	3	4	4

- (i) Is the current allocation in a safe state?
(ii) Can the request made by process P₁(1, 1, 0) be immediately granted? (10 Marks)

- a. Explain paging technique using diagrams. (06 Marks)
b. Consider the following memory references made by a program in KBs are:
101, 205, 302, 401, 208, 105, 503, 608, 212, 105,
220, 301, 712, 609, 316, 250, 109, 260, 358, 650
If the size of a page is 100 KB, how many page faults would occur for the following page replacement algorithms: (i) LRU (ii) FIFO (iii) Optimal (10 Marks)
c. What do you mean by Thrashing? Briefly explain the different causes of thrashing. (04 Marks)

10CS53

- | | | |
|---|---|------------|
| 6 | a. Discuss about the different file access methods. | (06 Marks) |
| | b. What is directory? Describe the General graph directory structure. | (04 Marks) |
| | c. Explain the Indexed allocation of files in disk space. | (05 Marks) |
| | d. Describe the different Free-Space management techniques in a disk. | (05 Marks) |
| | | |
| 7 | a. Explain the different Disk scheduling algorithms with example. | (10 Marks) |
| | b. Discuss with neat sketch diagram about access matrix protection model. | (10 Marks) |
| | | |
| 8 | a. Explain the different components of a Linux system. | (06 Marks) |
| | b. Discuss about process scheduling in Linux system. | (06 Marks) |
| | c. Explain the management of physical memory in Linux system. | (08 Marks) |



USN

--	--	--	--	--	--	--

10CS53

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021

Operating Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting at least TWO questions from each part.

PART – A

1. a. List and explain two sets of operating system services that are helpful to user as well as efficient operation of system. (08 Marks)
- b. Describe the differences between symmetric and asymmetric multiprocessing. What are the three advantages of multiprocessor systems? (06 Marks)
- c. What is virtual machine? With a neat diagram, explain the Just-In-Time (JIT) compiler, used in a JAVA virtual machine. (06 Marks)

2. a. Define IPC (Interprocess Communication). What are the different methods used for logical implementation of a message passing system? Explain any one. (06 Marks)
- b. Explain various multithreading models and the benefits of multithreading programs. (06 Marks)
- c. Consider the following set of processes:

Process	Arrival Time	Burst Time	Priority
P ₁	0	7	3
P ₂	3	2	2
P ₃	4	3	1
P ₄	4	1	1
P ₅	5	3	3

 (i) Draw Gantt charts to illustrate execution using preemptive Shortest Job First (SJF), Priority (preemptive), Round Robin (RR = 1 ms). (08 Marks)
- (ii) Which of these CPU scheduling algorithms gives minimum Average Waiting Time (AWT) and Minimum Average Turn Around Time (ATT)? (08 Marks)

3. a. Define Race Condition. Explain the requirements that a solution to a critical section problem must satisfy. (04 Marks)
- b. Discuss how Reader-Writer problem can be solved using semaphores with an example and also write the structure for Reader and Writer process. (10 Marks)
- c. What is monitor? Explain the solution to the classical dining Philosophers problem, using monitor. (06 Marks)

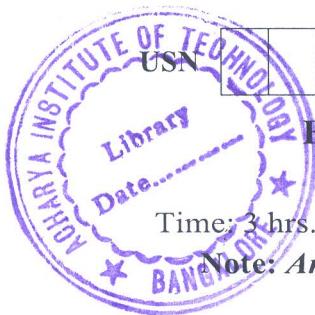
4. a. Describe the necessary conditions for a deadlock situation to arise, in a system. (04 Marks)
- b. What are the different methods for handling deadlocks? Explain Banker's algorithm. (10 Marks)
- c. Discuss the various approaches, used for deadlock recovery. (06 Marks)

PART – B

5. a. What is paging and swapping? (06 Marks)
- b. Discuss steps in handling a page fault with the help of a neat diagram. (06 Marks)
- c. Consider the following page reference string 5, 4, 3, 2, 1, 4, 3, 5, 4, 3, 2, 1, 5. Assume there are three memory frames. How many page faults would occur in the case of (i) FIFO (ii) LRU (iii) Optimal Algorithms? Note that initially all frames are empty. Which is the most efficient among them and also calculate the page fault rate for each algorithm? (08 Marks)

10CS53

- 6 a. With the help of neat diagram, describe:
(i) Tree-structures directory
(ii) Acyclic-graph directory
b. Explain contiguous, linked and indexed methods of allocating disk space. (08 Marks)
(12 Marks)
- 7 a. Given the following queue 95, 180, 34, 119, 11, 123, 62, 64 with head initially at track 50 and ending at 199. Calculate the number of moves using FCFS, SSTF, Elevator and C-look algorithms. Also calculate the average head movements. (12 Marks)
b. What are access matrix? Discuss the strengths and weaknesses of implementing an access matrix using access list that are associated with an object. (08 Marks)
- 8 Write short notes on the following:
a. LINUX design principles
b. Process management in LINUX
c. Network structure in LINUX
d. Different interprocess communication mechanism available in LINUX (20 Marks)



10CS53

Fifth Semester B.E. Degree Examination, Aug./Sept.2020

Operating Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, selecting atleast TWO questions from each part.

PART – A

1. a. Define an operating system. List the operating systems responsibilities in connection with process management and memory management. (06 Marks)
- b. Explain the services provided by an operating system that are designed to make using computer systems more convenient for users. (06 Marks)
- c. With a neat diagram of VMware architecture, explain the concept of virtual machine and benefits of using virtual machine concept. (08 Marks)

2. a. Describe the function of various schedulers with a block diagram. (06 Marks)
- b. Explain the three multithreading models. (06 Marks)
- c. Consider the following set of process with a length of the CPU Burst time given in milliseconds.

Process	Arrival time	Burst time	Priority
P ₁	0	7	3
P ₂	3	2	2
P ₃	4	3	1
P ₄	4	1	1
P ₅	5	3	3

- i) Draw Gantt charts illustrating the execution of these processes using Shortest Remaining Time First (SRTF), preemptive priority and round robin scheduling (time slice = 1ms)(a smaller priority number implies higher priority)
- ii) Calculate average waiting time and average turn around time for each of the scheduling algorithm in part(i). (08 Marks)

3. a. Explain critical section problem. Along with an appropriate "C" struct explain the implementation of wait() and signal() semaphore operations. (10 Marks)
- b. Explain the solution to classical dining philosopher's problem using monitor. (10 Marks)

4. a. What is deadlock? Describe the necessary conditions for a deadlock situation to arise in a system. (05 Marks)
- b. Explain deadlock detection mechanism for the system with single instance of each resource type. (05 Marks)
- c. Consider the following snapshot of a system :

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P ₀	0	1	0	7	5	3	3	3	2
P ₁	2	0	0	3	2	2			
P ₂	3	0	2	9	0	2			
P ₃	2	1	1	2	2	2			
P ₄	0	0	2	4	3	3			

Answer the following questions using Banker's algorithm.

- i) What is the content of matrix NEED?
- ii) Is the system in "Safe State"?
- iii) If the process P₁ requests for one additional instance of resource type A and two instances of resource type C, can the request be granted immediately? (10 Marks)

10CS53

PART - B

- 5 a. 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
for a memory with three frames. How many page faults would occur for LRU, FIFO and
OPTIMAL replacement algorithm? (09 Marks)
- b. With a neat diagram explain paging with Translation Look aside Buffer (TLB). (06 Marks)
- c. Explain commonly used strategies for dynamic storage allocation. (05 Marks)
- 6 a. List any four common file types along with their extensions and functions. (04 Marks)
b. Explain linked file allocation method, with advantages and disadvantages. (08 Marks)
c. Describe the methods used for implementing directories. (08 Marks)
- 7 a. Suppose that a disk has 200 cylinders numbered from 0 to 99 and the drive is currently
serving a request at cylinder 53. The previous request was at cylinder 70, (i.e, the disk arm is
moving towards cylinder 0). The queue of pending requests is 98, 183, 37, 122, 14, 124, 65,
67. Illustrate the disk movement using FCFS, SSTF and SCAN disk scheduling algorithm.
Also give the total head movement in each case. (09 Marks)
- b. Explain sector slipping with an example. (04 Marks)
- c. What is access matrix? Explain the implementation of access matrix using access lists for
objects. (07 Marks)
- 8 a. Explain clone() system call in Linux. (05 Marks)
b. Explain the components of kernel module support under Linux. (08 Marks)
c. Explain process scheduling in Linux. (07 Marks)

Fifth Semester B.E. Degree Examination, June/July 2019**Operating Systems**

Time: 3 hrs.

Max. Marks: 100

Note: Answer any **FIVE** full questions, selecting at least **TWO** questions from each part.

PART – A

1. a. Discuss the types of multiprocessor systems and the advantages of multiprocessor systems. (06 Marks)
- b. Which calls provide an interface to the service made available by an operating system? Explain the same with suitable examples. (06 Marks)
- c. Explain the method of operating system design which involves using object oriented programming technique with a neat diagram. (08 Marks)

2. a. List the operating system primitives that are used in direct and indirect communication between cooperating process. (04 Marks)
- b. Name and explain the formula that is used to predict the value of the next CPU burst required for shortest job first scheduling method. (06 Marks)
- c. Four processes P1, P2, P3 and P4 arrive in the order given below with the following CPU burst and priority values. Compute the average waiting time using:
 - i) Round Robin with time quantum = 3
 - ii) Preemptive priority scheduling (low values has high priority)
 - iii) Preemptive shortest job first scheduling.

Process	CPU burst	Arrival time	Priority
P1	8	0	5
P2	4	2	2
P3	6	1	3
P4	1	3	1

(10 Marks)

3. a. Consider two concurrently running processes P1 with statement S1 and S3 along with P2 with statements S2 and S4. The required order of execution of the statements must be S2, S4, S1 and S3. Solve this problem using semaphores. (08 Marks)
- b. Define and explain the semaphore structure, wait operation and signal operation of a semaphore which avoids busy waiting. (06 Marks)
- c. Discuss the importance of processor affinity and the types of processor affinity. (06 Marks)

4. a. Explain the steps involved in a resource allocation graph algorithm which is used to avoid deadlocks. (06 Marks)
- b. Explain how the circular wait condition can be used to prevent deadlocks. (04 Marks)
- c. Assume there are 3 processes P0 through P2 and 3 resource types each having 4 instances. The allocation and max matrix is given below:

	Allocation			Max		
	A	B	C	A	B	C
P0	2	1	2	4	1	3
P1	1	1	1	2	1	2
P2	0	1	1	1	1	1

SRI SAIRAM COLLEGE OF ENGINEERING

Answer the following questions using Banker's algorithm:

- i) Is the system in safe state? If so find safe sequence.
- ii) At time t1, if a request from process P1 arrives for (0, 1, 0) can the request be granted?
If so find the safe sequence.
- iii) At time t2, if a request from process P1 arrives for (1, 0, 0) can the request be granted?
If so find the safe sequence. (10 Marks)

PART – B

- 5 a. Illustrate and explain Belady's anomaly using a suitable example. (06 Marks)
b. Explain the strategy used to prevent thrashing. (06 Marks)
c. Explain segmentation and how the physical address is generated using a neat diagram. (08 Marks)
- 6 a. List and explain the most common schemes used for defining the logical structure of a directory. (10 Marks)
b. Discuss the four techniques used to keep track of free disk space. (10 Marks)
- 7 a. List and explain any four methods used for implementing access matrix. (10 Marks)
b. Suppose that a disk drive has 200 cylinders numbered 0 to 199. The drive is currently serving a request at cylinder 53 and the previous request was at 43. The queue of pending requests in FIFO order is 98, 183, 37, 122, 14, 124, 65, 67. Starting from current position calculate total cylinders crossed using SCAN, CSCAN and FCFS disk scheduling algorithms. (10 Marks)
- 8 Write short notes on:
 - a. Driver registration in LINUX (07 Marks)
 - b. Kernel synchronization in LINUX (07 Marks)
 - c. Implementation of virtual machines (06 Marks)

* * * * *