

Degree Engineering

B.E-II SEMESTER-IV

UNITWISE ASSIGNMENTS

**Operating Systems
(3140702)**



**Directorate of Technical Education, Gandhinagar,
Gujarat**

ASSIGNMENT-1

1. What is an operating system? List the types of operating system and explain in brief.
2. Write different operating system services (OS functions).
3. Explain multiprocessor operating system types in brief.
4. Explain Distributed operating system in brief .also give its advantages
5. Give the view of OS as Resource Manager.
6. Give the features of Time Sharing System and Real Time Operating System.
7. Give the features of Batch Operating System.
8. Differentiate :Multi-Programming,Multi-tasking ,Multiprocessing.
9. List and briefly define four elements of Computer System.
10. Give Difference between multi-processor and Multi-core System,
11. Under what circumstances would a user be better off using a timesharing system than a PC or a single-user workstation
12. Describe the differences between symmetric and asymmetric multiprocessing. What are three advantages and one disadvantage of multiprocessor systems?
13. Distinguish between the client–server and peer-to-peer models of distributed systems.

ASSIGNMENT-2

1. Differentiate process and thread. How do you create and terminate the process?
2. Draw a diagram which indicates the state of processes.
3. Explain PCB.
4. Explain thread in brief.
5. Five batch jobs A to E arrive at same time. They have estimated running times 10,6,2,4 and 8 minutes. Their priorities are 3,5,2,1 and 4 respectively with 5 being highest priority. For each of the following algorithm determine mean process turnaround time. Ignore process swapping overhead Round Robin, Priority Scheduling, FCFS, SJF.
6. What is scheduler? Explain queuing diagram representation of process scheduler with figure.
7. Suppose that the following processes arrive for the execution at the times indicated. Each process will run the listed amount of time. Assume preemptive scheduling.

Process	Arrival Time(ms)	Burst Time(ms)
P1	0.0	8
P2	0.4	4
P3	1.0	1

8. Consider the following set of processes with length of CPU burst time given in milliseconds.

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

9. Assume arrival order is: P1, P2, P3, P4, P5 all at time 0 and a smaller priority number implies a higher priority. Draw the Gantt charts illustrating the execution of these processes using preemptive priority scheduling.

10. Define: Turnaround Time, Response Time, Throughput, Thread, Waiting Time, Response Time.

11. What is Process ? Give the difference between a process and a program.

12. Explain Round Robin, Shortest Job First and Priority Scheduling Algorithms with illustration.

13. Consider the following set of processes with length of CPU burst time given in milliseconds.

Process	Burst Time	Priority
P1	10	5
P2	1	1
P3	2	3
P4	1	4
P5	5	2

Assume arrival order is: P1, P2, P3, P4, P5 at time 0,1,2,3,4 respectively and a smaller priority number implies a higher priority. Draw the Gantt charts for preemptive and non-preemptive priority scheduling. Calculate Average Turnaround Time and Average Waiting Time.

14. Five jobs A through E arrive at a computer center with following details

Job	Arrival Time	CPU Time
A	0	9
B	1	5
C	2	2
D	3	6
E	4	8

Calculate the Turnaround Time and Waiting Time for all processes applying (i) First Come First Serve (ii) Shortest Job First and (iii) Round Robin (with Time Quanta=3) algorithms.

15. Explain Context Switching. Discuss performance evaluation of FCFS(First Come First Serve) & RR (Round Robin) scheduling .

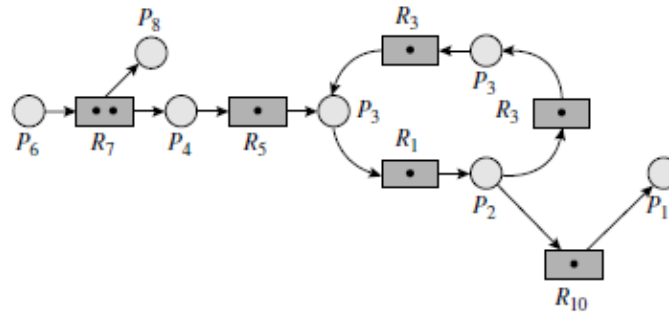
ASSIGNMENT-3

1. What is race condition? Explain the producer -consumer problem with a fatal race condition.
2. Explain readers and writers problem with solution.
3. What is priority inversion problem in inter-process communication? How to solve it with semaphore?
4. What is Semaphore? Give the implementation of Bounded Buffer Producer Consumer Problem using Semaphore.
5. What is advantage of using Monitor? Give the implementation of Bounded Buffer Producer Consumer Problem using “Monitor”.
6. Explain IPC Problem –Dining Philosopher Problem.
7. Explain IPC Problem – Readers & Writers Problem.
8. Discuss the Peterson’s solution for the race condition with algorithm.
9. What is Semaphore? How can we achieve the synchronization using semaphore for producer – consumer problem?
10. What is critical section? What is Mutual exclusion? Explain Peterson’s solution for mutual exclusion problem.

ASSIGNMENT-4

1. Explain the differences between deadlock, live lock and starvation.
2. What is Deadlock ? When it occurs?
3. Discuss deadlock prevention techniques for each possible condition which leads to deadlock.
4. What is Deadlock? List the conditions that lead to deadlock. How Deadlock can be prevented?
5. Explain any one method to avoid dead lock.
6. Demonstrate how Banker’s algorithm works for a single resource.
7. What is deadlock? Explain the Banker’s algorithm for deadlock avoidance.
8. How Resource Trajectories can be helpful in avoiding the deadlock?
9. Discuss Methods of Deadlock recovery.

10. Develop a matrix for the allocation state of the system of given Figure. Apply deadlock detection Algorithm to find the processes involved in deadlock.



11. In the following system:

	R1	R2	R3
P1	3	6	8
P2	4	3	3
P3	3	4	4

Max Need

	R1	R2	R3
P1	2	2	3
P2	2	0	3
P3	1	2	4

Allocated

Resources

	R1	R2	R3
Total Allocation	5	4	10

	R1	R2	R3
Total Exists	7	7	10

- Is the current allocation state safe?
- Would the following requests be granted in the current state by the banker's algorithm?
 - Process P1 requests (1, 1, 0)
 - Process P3 requests (0, 1, 0)
 - Process P2 requests (0, 1, 0)

12. Would the following requests be granted in the current state by the banker's algorithm?

	R1	R2
P1	2	5
P2	3	2

	R1	R2
P1	1	3
P2	2	1

	R1	R2
Total Allocation	3	4

	R1	R2
Total Exists	4	5

- Process P2 requests (1, 0)
- Process P2 requests (0, 1)
- Process P2 requests (1, 1)
- Process P1 requests (1, 0)
- Process P1 requests (0, 1)

ASSIGNMENT-5

1. Compare concept of paging and segmentation with suitable example.
2. Explain FIFO and LRU page replacement algorithm in detail.also Compare FIFO & LRU page replacement algorithm.
3. A computer has four page frames. The time of loading, time of last access and the R and M bit for each page given below.

Page	Loaded	Last Ref.	R	M
0	126	280	1	0
1	230	265	0	01
2	140	270	0	0
3	110	285	1	1

Which page NRU, FIFO, LRU will replace.

4. Explain page table in brief.
5. Explain swapping in memory management
6. Given memory partition of 100K, 500K, 200K, 300K, and 600K in order, How would each of the First-fit, Best-fit and Worst-fit algorithms place the processes of 212K, 417K, 112K and 426K in order? Which algorithm makes the most efficient use of memory?Show the diagram of memory status in each cases.
7. What is segmentation? Explain it with example.
8. Consider the following page reference string:
1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.
9. How many page faults would occur for the following replacement algorithms, assuming four frames? Remember all frames are initially empty,so your first unique pages will all cost one fault each and compare it.
 - a. LRU replacement
 - b. Optimal page replacement
 - c. FIFO replacement
10. Explain Swapping in Detail.
11. What is Paging? What is Page Table? Explain the conversion of Virtual Address to Physical Address in Paging with example.
12. Explain the concept of Segmentation for Memory Management. Explain why combined Paged Segmentation is used with illustration.
13. What is Virtual Memory? Explain.

14. Establish the necessity for memory management. Explain the memory management with the use of Linked Lists.
15. NRU page replacement algorithm.
16. Explain Virtual Memory Management with Paging in detail. Explain how Virtual Address is translated into Physical Address. Also compare Paging with Segmentation.
17. . Explain the combined Paged Segmentation Concept with illustration.
18. Memory Management with Linked List and Bitmap.
- 19. What is Virtual Memory? Explain Demand Paging .**

ASSIGNMENT-6

1. Explain concept of virtual memory and paging with example.
2. Write short note on File Allocation Table and I-node.
3. Explain elevator algorithm for scheduling disk requests.
4. Write short note on single-bus and dual-bus memory architecture.
5. Explain : Device Driver and Interrupt Service Routine
6. 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
 - a. Starting from the current head position, what is the total distance ((in cylinders) that the disk arm moves to satisfy all the pending requests, or each of the following disk scheduling
 - b. FCFS
 - c. SCAN
7. Explain RAID level system.
8. Explain SSTF and LOOK disk scheduling algorithms.
9. Explain steps for Direct Memory Access transfer.
10. What is system call? What is interrupt? How it is handled by OS?
11. Explain Goals of I/O Software.
12. Draw the block diagram for DMA. Explain the steps for DMA data transfer.
13. Disk requests come in to the disk for cylinders 10, 22, 20, 2, 40, 6 and 38. A seek takes 6 msec per cylinder move. How much seek time is for Closest cylinder next algorithm? Initially arm is at cylinder 20.
14. What are the uses of device driver and controller in OS? Explain.

15. Explain any Three Disk Arm Scheduling Algorithms with illustration.
16. What are the use of device driver & controller in OS? Explain.
17. Explain Device Independent I/O software.

ASSIGNMENT-7

1. List and explain the attributes and operations you can perform on the file.
2. Draw a diagram of Direct Memory Access and explain its operation
3. Explain different file system implementation methods.
4. Explain different file attributes. (ii) Explain different file operations in brief.
5. Explain various file attributes and file operations in brief.
6. Explain the linked list allocation file implementation technique.
7. Explain Different RAID levels and also Disk arm scheduling algorithm.
8. How Access Control List can be useful for managing file access?
9. What is inode? What is boot block? What is Superblock? How they are used to handle file management system in OS? Which methods are used to improve performance of file management system in OS.
10. Short note on RAID.
11. Short note on i- Node.
12. Explain Contiguous and Linked List Allocation for implementing File System.
13. Explain File attributes and File operations
14. Explain Access metrics mechanism.
15. Contiguous and Linked List Allocation for implementing File System.
16. Explain Access Control List.
17. Explain Implementation of File in Operating System.
18. Explain File system consistency.

ASSIGNMENT-8

1. Which are the ways for the user authentication? Explain each in brief.
2. Explain domain protection mechanism in brief.
3. What is Access Control list? Explain in brief.
4. Explain the Trojan Horse and Trap doors program threats
5. Explain the Access metrics mechanism
6. Write a note on Generic Security Attacks.

7. Design Principles of Security.

ASSIGNMENT-9

1. What is shell in Linux/Unix ? Explain the use of following command.
 2. Explain following commands: cp ,grep, head, sort, wc, rm
 3. Explain ‘man’ command in Unix.
 4. Explain directory structure of Unix.
 5. Explain ‘finger’ command in Unix.
 6. Explain ‘who’ command in Unix.
 7. Explain System administration commands in Unix.
 8. Explain kernel structure in UNIX.
 9. What is “inode”? Explain File and Directory Management of Unix Operating System.
 10. Write a shell script to find greater number out of 3 numbers.
 11. Advantages of LINUX/UNIX operating system over Windows.
 12. Give the functions of following UNIX commands: grep, cat, chmod
 13. Explain Files and Directory Management in UNIX Operating System.
 14. Write a Shell script to find Factorial of a given number.
 15. Use of “inode” in UNIX File System.
 16. Explain functions of Kernel of Unix OS. Also explain various security measures in Unix file system. How keyboards and monitors are represents in Unix file system?
 17. Explain Following commands in UNIX/LINUX OS.
 - I. chmod
 - II. head & tail
 - III. cut
 18. Write following Shell scripts in Unix/Linux :
 - I. To find five largest files in the current directory.
 - II. To find Sum & Average of ‘n’ numbers
- Write C Program to create exactly four child processes on UNIX /LINUX & assign each a unique task of addition , subtraction, multiplication, Division.