**Unit – 1**

1. What are Distributed Systems? Give their advantages.
2. Write a note on client server computing and peer to peer computing
3. What is the use of system programs? Explain various categories of system calls.
4. Explain Process Control Block.
5. Explain indirect communication in message passing system.
6. What are single and multithreaded processes? Write benefits of multithreaded programming.
7. Explain System Calls with respect to following definition, types and execution.
8. What is file management? Write the activities of operating system in regard to file management.
9. What are the advantages and disadvantages of threads?
10. Discuss Layered Approach in comparison with Kernel based Approach.
11. Explain the term cooperating processes. What are the advantages of the same?
12. State and explain various multithreading models
13. Define single and multiprocessor systems. Write advantages of multiprocessor systems
14. Write a note on time sharing operating system.
15. Enlist operating systems services. Describe any for in detail.
16. What is a system program? Explain various categories of it.
17. Describe five state process model.
18. Write a note on process scheduling

**Unit – 2**

1. Write a note on Peterson's solution
2. What is Semaphore? Write its usage.
3. Consider the following set of processes with the length of CPU burst time given in milliseconds. Illustrate the execution of the processes using Round Robin algorithm. Draw Gantt chart Also calculate average waiting time and turnaround time. Given- Time quantum-3 ms.
   1. Process : 1 2 3 4 5
   2. Burst time : 3 3 6 2 4
4. Describe various criteria for CPU-scheduling algorithms.
5. What is resource allocation graph? Using resource allocation graph, show that a cycle in the graph is both necessary and sufficient condition for the existence of deadlock
6. Explain safe state algorithm for deadlock avoidance
7. Consider the following table. Calculate average waiting time and turnaround time using SJF. (use non-pre-emptive technique)
   1. Process : 1 2 3 4 5
   2. Arrival Time : 0 4 6 8 8
   3. Burst Time : 7 4 3 4 4
8. What is a deadlock? State necessary and sufficient conditions for the same.
9. Explain semaphores with respect to following points.
   1. definition
   2. counting semaphore
   3. binary semaphore
   4. wait operation
   5. signal operation
10. Assume

1) Total resources in system:

A B C D

6 5 7 6

2) Available system resources are:

A B C D

3 1 1 2

3) Processes (currently allocated resources):

A B C D

P1 1 2 2 1

P2 1 0 3 3

P3 1 2 1 0

4) Processes (maximum resources):

A B C D

P1 3 3 2 2

P2 1 2 3 4

P3 1 3 5 0

Compute the need array and check whether system is under safe state or not. Also find safe sequence.

1. Explain the following concepts:
   1. Starvation
   2. aging
   3. TAT
   4. waiting time
   5. CPU utilization
2. Explain critical section problem in brief.
3. Explain critical section problem in detail.
4. Write a note on Dinning Philosophers problem.
5. Draw Gantt chart for FCFS and SJF for the following and find average waiting time.

Process : 1 2 3 4 5 6

CPU burst time : 7 3 5 8 7 9

Arrival Time : 0 2 2 2 3 3

1. Write different scheduling criterion
2. State and explain different types of data structures used in Banker's algoritm.
3. Describe safe state deadlock avoidance algorithm

**Unit – 3**

1. Explain in short segmentation technique.
2. Describe procedure for handling page fault in virtual memory management with diagram.
3. Assume that there are total 200 tracks are present on each surface of the disk. If request queue is 45, 39, 90, 65, 180, 120 and initial position of the head is 50. Apply SSTF disk scheduling and calculate total head movements.
4. Explain in brief Single-level and Two-level directory structure,
5. Write a note on linear list and hash table algorithms for directory implementation.
6. Which are access method of file system, Explain
7. Write a note on SCAN and C-SCAN scheduling algorithm.
8. Explain the concept of page fault. How the same can be handled by OS?
9. Consider the following page references string and find total number of page faults using LRU and FIFO where page frame size is 3.
   1. c d e d e f c e d f
10. State and explain different attributes of file
11. Disk request come into the disk driver for cylinder 10, 22, 20, 2, 40, 6 and 38 in that order. Find total head movements for each of the following algorithm FIFO and SRTF
12. Write short notes on
    1. DMA
    2. Polling
13. What is swapping? Explain in detail.
14. Write a note on segmentation memory management.
15. For the following page reference string calculate number of page faults with OPT and LRU. Frame size=3.

5 3 2 1 3 4 5 1 2 3 4 5 3 2 4

1. Briefly explain different file operations.
2. Explain in brief single level and two level directory structure. Consider a disk queue with requests for 1/O to blocks on cylinders

98, 34, 56, 122, 56, 75, 67, 183

1. Find total head movement of cylinders of head starts at 56 using FCFS and SSTF scheduling

**Max**

1. Write a note on operating system services.
2. What is Banker's Algorithm? Describe data structure needed to use in Banker's algorithm.
3. Consider the following page reference string and calculate total number of page faults using LRU and FIFO. (Assume frame size-3) Reference string - A,B,C,B,D,E,A,C,B,D
4. Describe various system calls used for File management and Device management.
5. What is Priority scheduling? Give an example. Write disadvantages of priority scheduling
6. State various responsibilities of child and parent process
7. Depict the gantt chart for FCFS and RR algorithm for the following problem and explain which is better? (for RR time slice is 5 units)

Process : 1 2 3 4 5

Burst time : 9 15 3 8 14

1. Write a note on Dinning-philosophers problem.
2. Define the following terms:
   1. Seek time
   2. Rotational latency
   3. Access time-
   4. Transfer time.
   5. Page fault
3. State and explain various techniques of free space management.
4. Describe structure of PCB.
5. Write a note on Round-Robin algorithm.
6. Explain the working of TL.B.
7. What is deadlock? Explain necessary conditions required to occur deadlock.
8. What is a thread? Write benefits of multithreaded programming.