



## **NRI INSTITUTE OF TECHNOLOGY**

(An Autonomous Institution, Approved by AICTE, Permanently Affiliated to JNTUK, Kakinada)

Accredited by NBA (CSE, ECE & EEE), Accredited by NAAC with 'A'  
Grade ISO 9001: 2015 Certified Institution

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# **OPERATING SYSTEM**

## **UNIT-1**

**Computer System and Operating System Overview:** Overview of computer operating systems, operating systems functions, operating systems structures and systems calls, operating systems generation.

- 1.Explain Briefly Layered and Micro-Kernel Operating System structures with neat sketch?**
- 2. Explain Briefly Simple and Monolithic Operating System structures with neat sketch?**
- 3.Write the Applications of Operating Systems and Explain Architecture of OS with neat sketch?**
- 4.What are the different types of Operating Systems? Explain them in detail.**
- 5.What are the different types of Functions of an OS? Explain any 6 of them.**
- 6.What are the System Calls? How do System calls help user programs to interact with the OS? Explain.**
- 7.What are the Services provided by an Operating System? Explain how each provides convenience to the users.**
- 8.Explain briefly about the Generations in OS?**
- 9.Difference between the functions of kernel and shell?**
- 10.Draw System Components in a neat chart?**
- 11.Explain about real time systems?**

## UNIT-2

**Process Management** – Process concept- process scheduling, operations, Inter process communication. Multi-Thread programming models. Process scheduling criteria and algorithms and their evaluation.

1. Define Process. Explain various steps involved in change of a process state with neat transition diagram.

2. Explain about Process Control Block (PCB) and different fields involved in it?

3. Explain Process Scheduling? Write the different types of categories in it?

4. What are the different Process Scheduling Queues and also explain Schedulers in it?

5. Differentiate the following:

(1) Process Vs Thread                      (2) User Thread Vs Kernel Thread

6. Define Thread. Explain the different types of Thread models?

7. What is the need of Inter Process Communication mechanism? Explain in detail.

8. Discuss about Process Scheduling Criteria and Explain the Terms in it?

9. Apply the following five processes represented as (Process, Arrival Time, Burst Time) with the length of CPU burst in milliseconds. {P1, 0, 6}. (P2, 2, 2), (P3, 3, 1), (P4, 4, 9), (P5, 5, 8)}.

i) Calculate average waiting time                      ii) Draw Gantt chart.

Solve the above by using

a.) First come First Search (FCFS)                      b.) Round Robin (RR)

c.) Shortest Job First (SJF)

i) Using Preemptive Approach                      ii) Using Non-Preemptive Approach

10. Explain FCFS, RR and SJF scheduling algorithm with illustrations.

## UNIT-3

**Concurrency**: Process synchronization, the critical-section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples.

**Memory Management**: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation.

1. Define Concurrency? List out the Principles & Problems involved in concurrency.

2. Explain Process Synchronization and Explain the following

a. Race Condition

b. Peterson's Solution

3. What is Critical section? Explain readers and writers problem with semaphore.

4. Demonstrate Semaphore and various Operations in it. Explain the two types in it?

5. Explain Synchronization Hardware and its two types of instructions with algorithms?

6. Discuss the Four Classic Problems of Synchronization.

7. Define Monitors. Explain the components & characteristics in it?

8.

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9. What does the term Swapping mean? Explain the concepts and architecture of it.

10. Define Contiguous Memory Allocation and Explain the following

a. Fixed Size Partitioning

b. Variable Size Partitioning

11. Define the Fragmentation. Illustrate various types in it?

12. Explain the following      a. Paging      b. Segmentation

## UNIT-4

**Virtual Memory Management:** virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing.

**Principles of deadlock** – system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock.

- 1.Explain in detail about Virtual Memory and its working procedure
  - 2.What is demand Paging and Page Fault?
  - 3.Explain any three Page Replacement Algorithms with an example.
  - 4.Explain about Allocation of Frames?
  - 5.Explain about Thrashing?
  6. What is page fault? Compute the number page faults for optimal page replacement strategy for the given reference string.1,2,3,4,5,3,4,1,6,7,8,7,8,9,7,8,9,5,4,5,4,2 with 4 page frames.
  - 7.Apply the below page replacement algorithm and find out page faults for the below page reference string 7,0,1,2,0,3,0,4,2,3,0,3,1,2,0 with 4 page frames.
    - a. FIFO
    - b. LRU
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- 8.What is Deadlock? What are necessary conditions for dead lock to occur?
  - 9.What is Safe-state? Write the Bankers algorithm for deadlock avoidance and explain it with the help of an example.
  - 10.Analyze deadlock avoidance with example.
  - 11.Analyze deadlock prevention with example.
  - 12.How do you recover from deadlock? Explain.

## UNIT-5

**File System Interface**-The concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

**File System implementation**- File system structure, file system implementation, directory implementation, allocation methods, free-space management

**Mass-storage structure**: overview of Mass storage structure, Disk structure, disk attachment, disk scheduling, swap-space management.

- 1.what is a file? Explain various file access methods.
- 2.Explain Disk Structure with neat diagram?
- 3.Demonstrate SCAN Disk Scheduling algorithm with example?
- 4.Explain about file systems in detail?
- 5.Examine free space management?
- 6.Outline mass-storage structure and its features with neat sketch.
- 7.Analyze disk scheduling algorithms.
- 8.Demonstrate file allocation methods.
- 9.Explain the process of file mounting? Illustrate with an example.