CS405 Operating Systems UNIT -02 DETAILED NOTES WITH EASY EXPLAINATION.

File Concept :-

Introduction

Computer me data permanently store karne ke liye files ka use kiya jata hai.

Agar file na ho to computer band hote hi sara data delete ho jayega.

Operating System data ko files ke form me organize karta hai.

Definition

Exam Definition

"A File is a collection of related information stored on secondary storage devices and identified by a unique name."

OR

"A file is a named collection of logically related data stored on a storage device."

Real Life Example

Suppose aapke paas:

```
Student Records

Student Names

Student Marks
```

Ye sab information ek file me store ki ja sakti hai.

Example:

```
student.txt
```

Diagram of File Concept

⭐⭐⭐⭐⭐⭐ EXAM DIAGRAM

```
User

 ↓

Operating System

 ↓

----------------
|    FILE      |
----------------

 ↓

Secondary Storage
(Hard Disk / SSD)
```

Need of Files

Without Files:

❌ Data Lost after power off

❌ No permanent storage

❌ Difficult data management

With Files:

✅ Permanent Storage

✅ Easy Access

✅ Data Sharing

✅ Data Security

Characteristics of File

1. Named Collection

Har file ka unique naam hota hai.

Example:

```
notes.txt

marks.xls

photo.jpg
```

---

2. Permanent Storage

Data permanently store hota hai.

---

3. Organized Data

Data logically arranged hota hai.

---

4. Secondary Storage

Files hard disk ya SSD me store hoti hain.

---

5. Shared Resource

Multiple users file access kar sakte hain.

File Attributes

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

File ke properties ko File Attributes kehte hain.

---

1. File Name

File ka naam.

Example:

```
os_notes.pdf
```

---

2. Identifier

Unique number assigned by OS.

---

3. Type

File type batata hai.

Example:

```
.txt

.pdf

.jpg

.mp4
```

---

4. Location

Disk me file kaha store hai.

---

5. Size

File kitni memory occupy karti hai.

Example:

```
10 KB

50 MB
```

---

6. Protection

Access rights define karta hai.

Example:

```
Read

Write
```

```
Execute
```

---

7. Time and Date

Creation aur modification time.

File Attributes Diagram

```
File

 |

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

Name

Type

Size

Location

Protection

Date/Time
```

Types of Files

⭐⭐⭐⭐ Frequently Asked

---

1. Text File

Characters store karti hai.

Example:

```
notes.txt
```

---

2. Binary File

Machine readable data.

Example:

```
.exe
```

---

3. Source File

Program source code.

Example:

```
main.c
```

---

4. Object File

Compiled code.

Example:

```
main.obj
```

File Operations

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Operating System files par different operations perform karta hai.

---

1. Create

New file create karna.

---

2. Open

File ko access karna.

---

3. Read

File se data read karna.

---

4. Write

File me data store karna.

---

5. Append

End me data add karna.

---

6. Close

File band karna.

---

7. Rename

File ka naam change karna.

---

8. Delete

File remove karna.

File Operations Diagram

```
Create

  ↓

Open

  ↓

Read/Write

  ↓

Close

               ↓

           Delete
```

File Structure

File mainly 3 tarah ki ho sakti hai:

---

1. Byte Sequence

Simple sequence of bytes.

---

2. Record Sequence

Records ki form me data.

---

3. Tree Structure

Hierarchical structure.

Advantages of Files

1. Permanent Storage

---

2. Easy Access

---

3. Data Sharing

---

4. Security

---

5. Organized Data Management

Disadvantages

1. Memory Consumption

---

2. Corruption Risk

---

3. Unauthorized Access

Viva Questions

Q1. What is a File?

Collection of related information.

Q2. Why are files required?

For permanent storage.

Q3. What are file attributes?

Properties of a file.

Q4. Give examples of file types.

Text, Binary, Source.

Q5. What is file protection?

Restricting unauthorized access.

Frequently Asked RGPV Questions

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7 Marks

1. Explain File Concept with diagram.
2. Explain types of files.
3. Explain file operations.

---

14 Marks

Q. Explain File Concept with neat diagram.

Q. Explain File Attributes and File Operations.

Q. Discuss the characteristics and structure of files.

PYQ Trend Analysis

Topic	Frequency
File Concept	⭐⭐⭐⭐⭐
File Attributes	⭐⭐⭐⭐⭐
File Operations	⭐⭐⭐⭐⭐
Types of Files	⭐⭐⭐⭐

Expected 2026 Questions

🔥 Define File and explain File Concept.

🔥 Explain File Attributes in detail.

🔥 Explain various File Operations.

🔥 Explain types of files with examples.

🔥 Discuss the characteristics of files.

One-Minute Revision

```
FILE
```

```
↓

Collection of Related Data

Attributes:
Name
Type
Size
Location
Protection
Date/Time

Operations:
           Create
          Open
          Read
         Write
         Close
         Rename
         Delete
```

Memory Trick

File Attributes = NTSLPD

```
N → Name

T → Type

S → Size

L → Location

P → Protection

           D → Date/Time
```

File Operations = CORWCRD

```
C → Create

O → Open

R → Read

W → Write

C → Close

           R → Rename

          D → Delete
```

🎯 **Exam Tip:** File Concept ke answer me Definition + Diagram + File Attributes + File Operations + Advantages zarur likho. Ye answer easily 3–4 pages bhar deta hai aur full marks lane wala topic hai.

User's View and System Programmer's View of File System :-

Introduction

File System Operating System ka important part hai jo files ko organize aur manage karta hai.

File System ko do alag perspectives se dekha ja sakta hai:

```
1. User's View

2. System Programmer's View
```

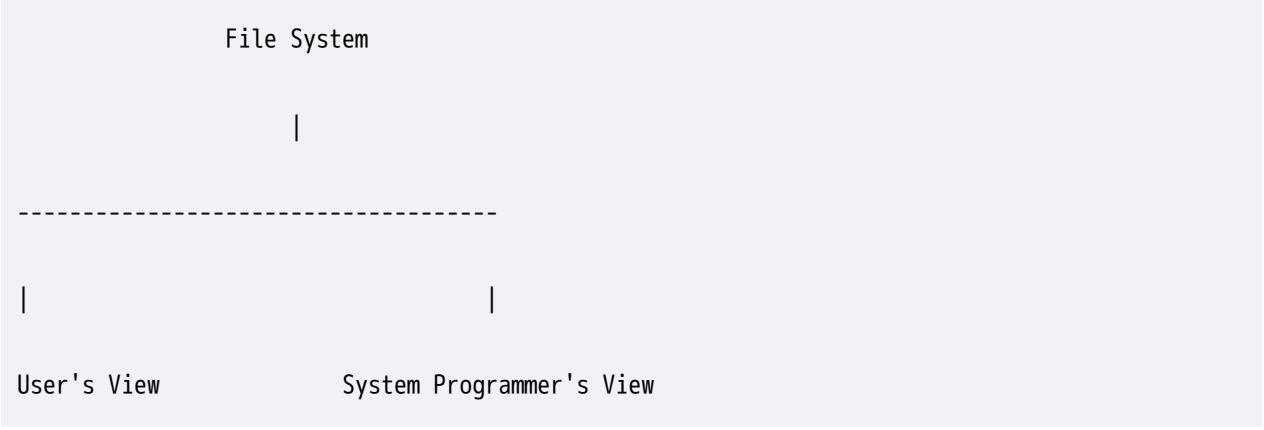
File System

Definition

"A File System is a method used by the Operating System to store, organize, manage and retrieve files from secondary storage devices."

Diagram

⭐⭐⭐⭐⭐ EXAM DIAGRAM



---

1. User's View of File System

⭐⭐⭐⭐⭐ MOST IMPORTANT

Introduction

User file system ko simple files aur folders ke roop me dekhta hai.

User ko file ka internal structure nahi pata hota.

User sirf file ko create, open, read aur save karta hai.

Definition

"User's View of File System is the way in which files and directories appear to end users."

User Se Kya Dikhta Hai?

```
Documents

Pictures

Videos

Music

Downloads
```

Example

Windows Explorer:

```
My Computer

  |

Documents

Pictures

            Videos
```

User sirf folders aur files dekhta hai.

User Operations

Create File

Open File

Read File

Write File

Rename File

Delete File

Diagram

```
User

  ↓

File

  ↓

Folder

             ↓

          Disk
```

User View Characteristics

✔ Simple

✔ Easy to Understand

✔ GUI Based

✔ User Friendly

✔ No Internal Details

Advantages

Easy File Access

Easy Navigation

Better User Experience

Disadvantages

Internal Structure Hidden

Less Control

---

2. System Programmer's View of File System

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Introduction

System Programmer file system ko implementation level par dekhta hai.

Uske liye file sirf data ka collection nahi hai.

Woh metadata, file descriptors, disk blocks aur storage structure bhi dekhta hai.

Definition

"System Programmer's View of File System focuses on the internal implementation and management of files by the Operating System."

Internal Components

File Control Block (FCB)

Inode

Disk Blocks

File Descriptor

Allocation Tables

Diagram

```
Application

      ↓

Operating System

      ↓

File Control Block

      ↓

Disk Blocks

                  ↓
```

```
        Storage Device
```

Example

Programmer ke liye:

```
open()

read()

write()

close()
```

important hote hain.

Programmer Operations

File Creation

File Allocation

Memory Mapping

Disk Block Management

Access Control

System Calls

System Programmer View Characteristics

✔ Internal Structure Visible

✔ Low-Level Access

✔ File Allocation Knowledge

✔ Metadata Management

✔ System Call Usage

Advantages

Better Resource Control

Efficient File Management

Optimization Possible

Disadvantages

Complex

Requires Technical Knowledge

File Control Block (FCB)

⭐⭐⭐⭐⭐ Frequently Asked

FCB ek data structure hai jo file ki information store karta hai.

FCB Stores

```
File Name

File Size

Location

Owner

Permissions

Creation Date
```

FCB Diagram

```
File Control Block

      |

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

Name

Size

Location

Owner

Permissions
```

User View vs System Programmer View

⭐⭐⭐⭐⭐⭐ EXAM FAVOURITE TABLE

User's View	**System Programmer's View**
High Level View	Low Level View

File & Folder Based	Disk Block Based
Easy to Understand	Complex
GUI Oriented	System Call Oriented
No Internal Details	Internal Details Visible
User Focused	Implementation Focused
Simple Operations	Advanced Operations

Real Life Example

Suppose Library hai.

User's View

```
Book Name

Subject

Author
```

Student ko sirf ye dikhta hai.

Librarian's View

```
Book Number

Rack Number

Issue Record

Location
```

Ye System Programmer View hai.

Viva Questions

Q1. What is File System?

Method to organize and manage files.

Q2. What is User's View?

View seen by end users.

Q3. What is System Programmer's View?

Internal implementation view.

Q4. What is FCB?

File Control Block.

Q5. Why is FCB required?

To store file metadata.

Frequently Asked RGPV Questio

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7 Marks

1. Compare User's and System Programmer's View.
2. Explain File System architecture.
3. Explain File Control Block.

---

14 Marks

Q. Explain User's and System Programmer's View of File System.

Q. Compare User's View and System Programmer's View with suitable examples.

Q. Explain File System from user and implementation perspectives.

PYQ Trend Analysis

Topic	Frequency
User's View	⭐⭐⭐⭐⭐
System Programmer's View	⭐⭐⭐⭐⭐
Comparison Table	⭐⭐⭐⭐⭐
FCB	⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain User's View of File System.

🔥 Explain System Programmer's View of File System.

🔥 Compare User and System Programmer Views.

🔥 Explain File Control Block (FCB).

🔥 Explain File System architecture.

One-Minute Revision

```
File System

      |

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

User View

- Files
- Folders
- GUI
- Easy

   System Programmer View

- FCB
- Disk Blocks
- Metadata
- System Calls
```

Memory Trick

User View = FFGOR

```
F → Files
F → Folders
G → GUI
          O → Operations
           R → Read/Write
```

Programmer View = FDMA

```
F → FCB
D → Disk Blocks
```

```
M → Metadata
          A → Allocation
```

🎯 **Exam Tip:** Is answer me sabse important cheez **User View vs System Programmer View comparison table** hai. Diagram + FCB + comparison table likhoge to 14 marks ka answer easily 3–4 pages bhar jayega aur full marks mil sakte hain. 🚀📚

Disk Organization :-

Introduction

Computer me data permanently store karne ke liye secondary storage devices use kiye jate hain.

Sabse common secondary storage device hai:

```
Hard Disk (HDD)
```

Data ko efficiently store aur retrieve karne ke liye disk ko logically aur physically organize kiya jata hai.

Is arrangement ko **Disk Organization** kehte hain.

Definition

"Disk Organization is the physical and logical arrangement of data on a disk for efficient storage and retrieval."

Need of Disk Organization

Without Organization:

❌ Slow Access

❌ Data Loss

❌ Difficult Retrieval

❌ Poor Performance

With Organization:

✅ Fast Access

✅ Better Storage

✅ Easy Retrieval

✅ Efficient Disk Usage

Structure of Magnetic Disk

⭐⭐⭐⭐⭐ MOST IMPORTANT

Disk multiple circular plates (Platters) se bani hoti hai.

Har platter magnetic material se coated hota hai.

Disk Components

```
Platter

Track

Sector

Cylinder

Read/Write Head
```

```
Spindle
```

Basic Disk Structure Diagram

⭐⭐⭐⭐⭐⭐ EXAM DIAGRAM

```
       ----------------
     /                  \
    |      TRACK         |
    |   ------------     |
    |  /            \    |
    | |   SECTOR     |   |
    |  \            /    |
    |   ------------     |
     \                  /
       ----------------
```

---

1. Platter

⭐⭐⭐⭐ Frequently Asked

Platter disk ki circular magnetic plate hoti hai.

Data platter par store hota hai.

Diagram

```
 --------------------
|      PLATTER       |
 --------------------
```

Characteristics

✔ Circular Shape

✔ Magnetic Surface

✔ Permanent Storage

---

2. Track

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Track concentric circular path hoti hai.

Data tracks me organize hota hai.

Diagram

```
 ------------------
|   Track 1       |
|  -----------    |
| Track 2         |
|  -----------    |
| Track 3         |
 ------------------
```

Definition

Track is a concentric circular path on a disk surface used to store data.

---

3. Sector

⭐⭐⭐⭐⭐ MOST IMPORTANT

Track ko small parts me divide kiya jata hai.

In parts ko sectors kehte hain.

Diagram

```
      \  |  /
       \ | /
    ---- O ----
       / | \
      /  |  \
```

Har slice = Sector

Definition

Sector is the smallest physical storage unit on a disk.

Typical Sector Size

```
512 Bytes

4096 Bytes (Modern Disks)
```

---

4. Cylinder

⭐⭐⭐⭐⭐ MOST IMPORTANT

Same radius ke tracks ka collection cylinder kehlata hai.

Diagram

```
Platter 1 → Track 5

Platter 2 → Track 5

Platter 3 → Track 5

        ↓

    Cylinder
```

Definition

Cylinder is a collection of tracks located at the same position on different platters.

Advantage

Fast Access.

---

5. Read/Write Head

⭐⭐⭐⭐ Frequently Asked

Data read aur write karne ke liye use hota hai.

Har platter surface ka apna head hota hai.

Diagram

```
Head

  ↓

===========
 Platter
===========
```

Functions

✔ Read Data

✔ Write Data

---

6. Spindle

Disk platters ko rotate karta hai.

Diagram

```
     |
     |
     |
   Spindle
                |
                |
```

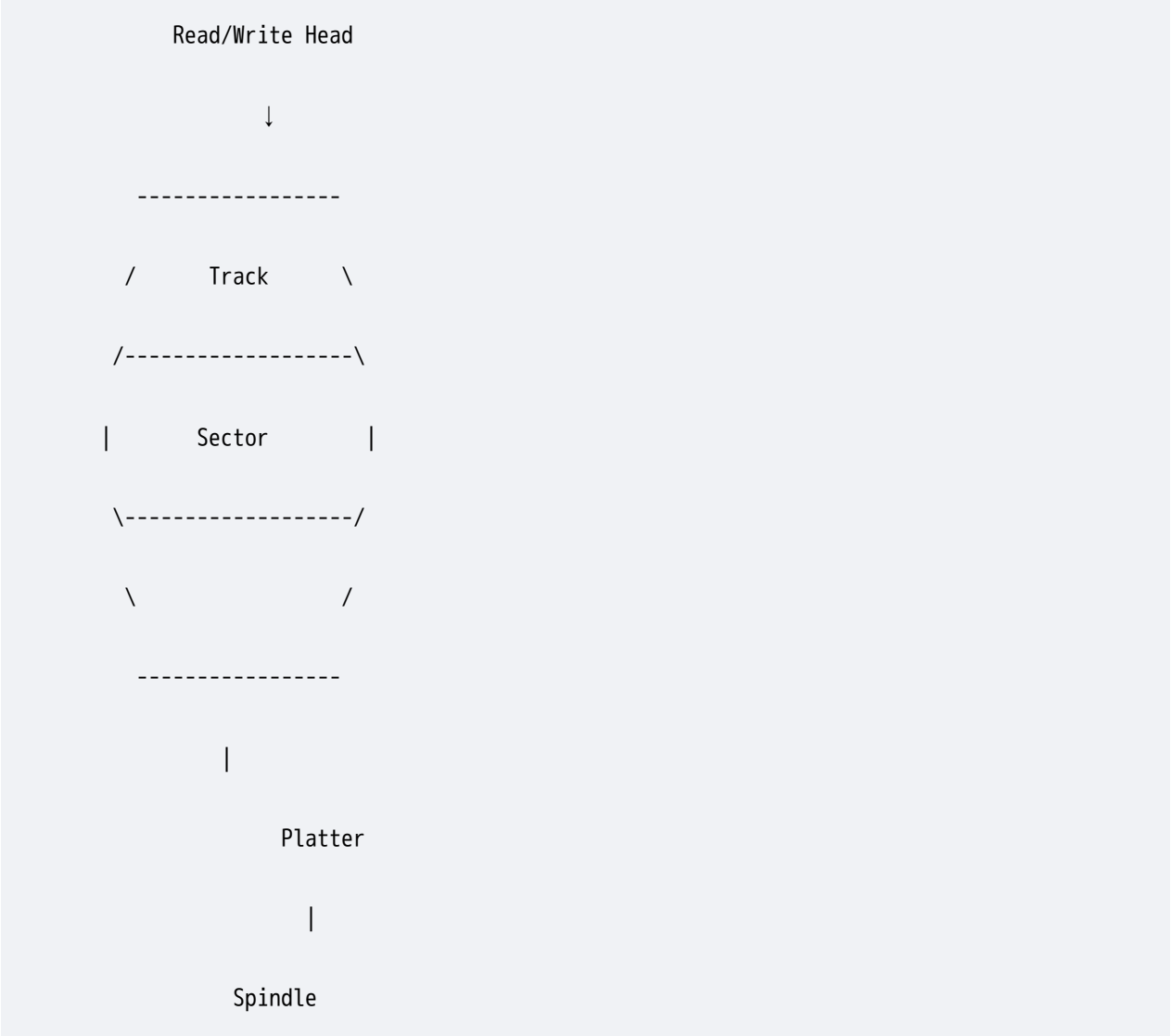
Functions

✔ Rotation

✔ Maintain Speed

Complete Disk Organization Diagram

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT



Disk Addressing

Disk address identify karne ke liye use hota hai:

```
Cylinder Number

Track Number
```

```
Sector Number
```

Example

```
Cylinder = 10

Track = 5

Sector = 20
```

Access Time of Disk

⭐⭐⭐⭐ Frequently Asked

Disk Access Time =

```
Seek Time

+

Rotational Latency

+

Transfer Time
```

Seek Time

Head ko required track tak move karne ka time.

Rotational Latency

Required sector head ke niche aane ka waiting time.

Transfer Time

Actual data transfer time.

Formula

Access Time=Seek Time+Rotational Latency+Transfer TimeAccess\ Time = Seek\ Time + Rotational\ Latency + Transfer\ TimeAccess Time=Seek Time+Rotational Latency+Transfer Time

---

Advantages of Disk Organization

1. Fast Data Retrieval

2. Efficient Storage

3. Better Resource Utilization

4. Easy Data Management

5. Improved Performance

Disadvantages

1. Mechanical Delay

2. Head Crash Possibility

3. Fragmentation

Real Life Example

Imagine a library.

```
Library = Disk

Shelf = Track

Book Section = Sector

Book = Data
```

Jitni achhi organization hogi utni jaldi book milegi.

Track vs Sector

⭐⭐⭐⭐⭐ EXAM FAVOURITE

Track	Sector
Circular Path	Part of Track
Larger Unit	Smaller Unit
Contains Sectors	Stores Data
Concentric Circle	Pie-Shaped Division

Viva Questions

Q1. What is Disk Organization?

Arrangement of data on disk.

Q2. What is a Track?

Circular path on disk.

Q3. What is a Sector?

Smallest physical storage unit.

Q4. What is a Cylinder?

Collection of tracks at same radius.

Q5. What is Seek Time?

Time to move head to desired track.

Frequently Asked RGPV Questions

---

7 Marks

1. Explain structure of magnetic disk.
2. Explain components of disk organization.
3. Explain disk access time.

---

14 Marks

Q. Explain Disk Organization with neat diagram.

Q. Explain Track, Sector and Cylinder with suitable diagrams.

Q. Discuss structure and working of magnetic disk organization.

PYQ Trend Analysis

Topic	Frequency
Disk Organization	⭐⭐⭐⭐⭐
Track & Sector	⭐⭐⭐⭐⭐
Cylinder	⭐⭐⭐⭐⭐
Disk Access Time	⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain Disk Organization with neat diagram.

🔥 Explain Track, Sector and Cylinder.

🔥 Explain disk access time.

🔥 Draw and explain structure of magnetic disk.

🔥 Differentiate Track and Sector.

One-Minute Revision

```
Disk Organization

↓

Platter
↓
Track
↓
Sector
```

```
↓
        Cylinder
           ↓
       Read/Write Head
            ↓
      Spindle
```

Memory Trick: PTSCRS

```
P → Platter

T → Track

S → Sector

C → Cylinder

R → Read/Write Head

          S → Spindle
```

🎯 **Exam Tip:** Disk Organization ke answer me **Track + Sector + Cylinder ke diagrams** zarur banao. Ye diagrams hi examiner ko dikhate hain ki aapko topic aata hai aur answer 3–4 pages tak aasani se bhar jata hai.

Tape Organization :-

Introduction

Magnetic Tape ek secondary storage device hai jiska use large amount data ko store karne ke liye kiya jata hai.

Tape Organization data ko tape par sequential form me arrange karne ki technique hai.

Tape me data continuously ek sequence me store hota hai.

Definition

"Tape Organization is the method of storing and arranging data sequentially on a magnetic tape for storage and retrieval purposes."

Basic Idea

Disk me:

```
Random Access
```

Possible hota hai.

Lekin Tape me:

```
Sequential Access
```

hota hai.

Data ko access karne ke liye pehle wale records ko pass karna padta hai.

Magnetic Tape Structure

⭐⭐⭐⭐⭐ EXAM DIAGRAM

```
-------------------------------------------------

| Record1 | Record2 | Record3 | Record4 | Record5 |

-------------------------------------------------
```

Data ek sequence me store hota hai.

Components of Tape Organization

1. Magnetic Tape

Plastic ribbon jiske upar magnetic coating hoti hai.

Data permanently store hota hai.

---

2. Records

Tape par stored data records ke form me hota hai.

Example:

```
Student Record

Employee Record

Bank Record
```

---

3. Blocks

Multiple records milkar block banate hain.

Diagram

```
Record1
Record2
Record3

    ↓

 Block
```

---

4. Inter Block Gap (IBG)

Do blocks ke beech ka gap.

Diagram

```
Block1

==== Gap ====

Block2

==== Gap ====

Block3
```

Tape Organization Diagram

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

```
-------------------------------------------------------

| Record | Record | Record | Record | Record | Record |

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

         Block 1

================ IBG =================

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

| Record | Record | Record | Record | Record | Record |

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

                Block 2
```

Working of Tape Organization

Step 1

Data records create kiye jate hain.

Step 2

Records ko blocks me organize kiya jata hai.

Step 3

Blocks magnetic tape par sequentially store hote hain.

Step 4

Read operation ke time records sequence me access hote hain.

Sequential Access Method

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Tape me direct access possible nahi hota.

Suppose:

```
Record 10
```

access karna hai.

To:

```
Record1
```

```
Record2

Record3

...

          Record10
```

tak sequentially jana padega.

Advantages of Tape Organization

1. Low Cost

Tape storage cheap hoti hai.

---

2. Large Storage Capacity

Bahut zyada data store kar sakti hai.

---

3. Backup Purpose

Data backup ke liye best.

---

4. Long-Term Storage

Archival storage ke liye useful.

---

5. Reliability

Data long time tak safe rehta hai.

Disadvantages of Tape Organization

1. Sequential Access

Direct access possible nahi.

---

2. Slow Access Time

Disk ke comparison me slow.

---

3. Difficult Updating

Beech me data update karna difficult.

---

4. Mechanical Wear

Tape damage ho sakti hai.

Applications of Tape Organization

⭐⭐⭐⭐ Frequently Asked

Data Backup

Banking Records

Scientific Data Storage

Government Archives

Large Database Backup

Tape vs Disk Organization

⭐⭐⭐⭐⭐⭐ EXAM FAVOURITE TABLE

Magnetic Tape	**Magnetic Disk**
Sequential Access	Direct Access
Slow	Fast
Low Cost	Costly
Backup Storage	Primary Secondary Storage
Large Capacity	Moderate Capacity
Archival Use	Daily Use

Real Life Example

Suppose cassette tape hai.

Agar song number 10 sunna hai:

```
Song1

Song2

Song3

...

Song10
```

tak jana padega.

Ye hi Sequential Access hai.

Diagram of Sequential Access

```
Record1
   ↓
Record2
   ↓
Record3
   ↓
          Record4
             ↓
           Record5
```

Viva Questions

Q1. What is Tape Organization?

Method of storing data on magnetic tape.

Q2. What type of access is used in tape?

Sequential Access.

Q3. What is IBG?

Inter Block Gap.

Q4. Why is tape used?

For backup and archival storage.

Q5. Is direct access possible in tape?

No.

Frequently Asked RGPV Questions

---

7 Marks

1. Explain Tape Organization with diagram.
2. Compare Tape and Disk Organization.
3. Explain working of Magnetic Tape.

---

14 Marks

Q. Explain Tape Organization with neat diagram.

Q. Discuss structure, working, advantages and disadvantages of Magnetic Tape Organization.

Q. Compare Magnetic Tape and Magnetic Disk Organization.

PYQ Trend Analysis

Topic	Frequency
Tape Organization	⭐⭐⭐
Sequential Access	⭐⭐⭐⭐
Tape vs Disk	⭐⭐⭐⭐⭐
Magnetic Tape Structure	⭐⭐⭐

Expected 2026 Questions

🔥 Explain Tape Organization with diagram.

🔥 Compare Tape Organization and Disk Organization.

🔥 Explain Sequential Access Method.

🔥 Discuss advantages and disadvantages of Magnetic Tape.

One-Minute Revision

```
Tape Organization

↓

Magnetic Tape

↓

Records

↓

Blocks

↓

          IBG

           ↓

     Sequential Access
```

Memory Trick: TRBIS

```
T → Tape

R → Records

B → Blocks
```

```
I → IBG

          S → Sequential Access
```

🎯 **Exam Tip:** Tape Organization ka answer likhte waqt **Tape Structure Diagram + Tape vs Disk Comparison Table** zarur banao. Ye dono examiner ko impress karte hain aur answer ko 3 pages tak easily extend kar dete hain.

Different Modules of a File System:-

Introduction

File System Operating System ka important component hai jo files ko create, store, retrieve aur manage karta hai.

File System ko efficiently work karne ke liye kai modules me divide kiya jata hai.

Har module ek specific task perform karta hai.

Definition

"File System Modules are the different layers or components of a file system that work together to manage files and storage devices efficiently."

File System Architecture Diagram

⭐⭐⭐⭐⭐⭐ EXAM DIAGRAM

```
                USER

                  |
```

Main Modules of File System

There are mainly four important modules:

```
1. Logical File System

2. File Organization Module

3. Basic File System

4. I/O Control
```

---

1. Logical File System

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Introduction

Ye File System ka highest level module hai.

Ye users aur applications ko file-related services provide karta hai.

Functions

✔ File Creation

✔ File Deletion

✔ Directory Management

✔ File Protection

✔ Access Rights Management

Diagram

```
User

  ↓

Logical File System

  ↓

Files & Directories
```

Example

```
Create File
```

```
Delete File

Rename File
```

Advantages

✔ Easy File Access

✔ Security

✔ User Friendly

---

2. File Organization Module

⭐⭐⭐⭐⭐ MOST IMPORTANT

Introduction

Ye module files ko disk par organize karta hai.

Disk space allocation aur free space management isi module ka kaam hai.

Functions

✔ Disk Space Allocation

✔ Free Space Management

✔ File Allocation Methods

Allocation Methods

```
Contiguous Allocation

Linked Allocation

Indexed Allocation
```

Diagram

```
File Organization Module

        |

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

Disk Allocation

Free Space Management
```

Advantages

✔ Efficient Disk Usage

✔ Fast Retrieval

---

3. Basic File System

⭐⭐⭐⭐⭐ Frequently Asked

Introduction

Ye module logical blocks ko physical blocks me convert karta hai.

Functions

✔ Block Read

✔ Block Write

✔ Buffer Management

✔ Disk Request Handling

Diagram

```
Logical Block

      ↓

Basic File System

      ↓

Physical Block
```

Example

```
Read Block

Write Block
```

Advantages

✔ Efficient Data Transfer

✔ Better Performance

---

4. I/O Control Module

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Introduction

Ye module hardware devices ko control karta hai.

Device drivers isi module ka part hote hain.

Functions

✔ Device Communication

✔ Interrupt Handling

✔ Driver Management

✔ Data Transfer

Diagram

```
I/O Control

     |

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

Device Drivers

           Interrupt Handler
```

Example

```
Hard Disk Driver

Printer Driver
```

```
        USB Driver
```

Advantages

✔ Hardware Independence

✔ Better Device Management

Working of File System Modules

⭐⭐⭐⭐⭐⭐ EXAM FAVOURITE

Step 1

User file request deta hai.

Step 2

Logical File System request process karta hai.

Step 3

File Organization Module disk location find karta hai.

Step 4

Basic File System block access karta hai.

Step 5

I/O Control hardware ko command deta hai.

Step 6

Data user ko return hota hai.

Working Diagram

```
User

 ↓

Logical File System

 ↓

File Organization Module

 ↓

Basic File System

 ↓

        I/O Control

           ↓

       Disk
```

Summary Table

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Module	**Main Function**
Logical File System	File & Directory Management
File Organization Module	Disk Space Allocation

Basic File System	Block Management
I/O Control	Device Management

Advantages of Modular File System

1. Easy Maintenance

2. Better Performance

3. Improved Security

4. Efficient Storage Management

5. Hardware Independence

Viva Questions

Q1. What is a File System Module?

Component of file system performing specific task.

Q2. Which module manages directories?

Logical File System.

Q3. Which module performs disk allocation?

File Organization Module.

Q4. Which module handles device drivers?

I/O Control Module.

Q5. What is the role of Basic File System?

Block management.

Frequently Asked RGPV Questions

---

7 Marks

1. Explain different modules of File System.
2. Explain File System Architecture.
3. Explain Basic File System.

---

14 Marks

Q. Explain Different Modules of a File System with neat diagram.

Q. Explain File System Architecture and its modules.

Q. Discuss Logical File System, File Organization Module, Basic File System and I/O Control.

PYQ Trend Analysis

Topic	Frequency
File System Modules	⭐⭐⭐⭐⭐
Logical File System	⭐⭐⭐⭐
File Organization Module	⭐⭐⭐⭐⭐
File System Architecture	⭐⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain Different Modules of a File System.

🔥 Explain File System Architecture with neat diagram.

🔥 Explain Logical File System and File Organization Module.

🔥 Explain role of Basic File System.

🔥 Explain I/O Control Module.

One-Minute Revision

```
File System Modules

          ↓

1. Logical File System
2. File Organization Module
          3. Basic File System
          4. I/O Control
```

Memory Trick: LFBI

```
L → Logical File System
```

```
F → File Organization Module

B → Basic File System

            I → I/O Control
```

🎯 **Exam Tip:** Is question me sabse important hai **File System Architecture Diagram**. Diagram + 4 modules ke functions + summary table likh doge to 14 marks ka answer easily 3–4 pages bhar dega aur full marks mil sakte hain. 🚀📚

Disk Space Allocation Methods:-

Introduction

Jab koi file disk me store hoti hai to Operating System ko decide karna padta hai ki file ko disk ke kis location par store karna hai.

File ko disk blocks me store karne ki technique ko:

```
Disk Space Allocation Method
```

kehte hain.

Definition

"Disk Space Allocation Methods are techniques used by the Operating System to allocate disk blocks to files."

Need of Disk Allocation

Without Allocation:

❌ Data Management Difficult

❌ Space Wastage

❌ Slow Access

With Allocation:

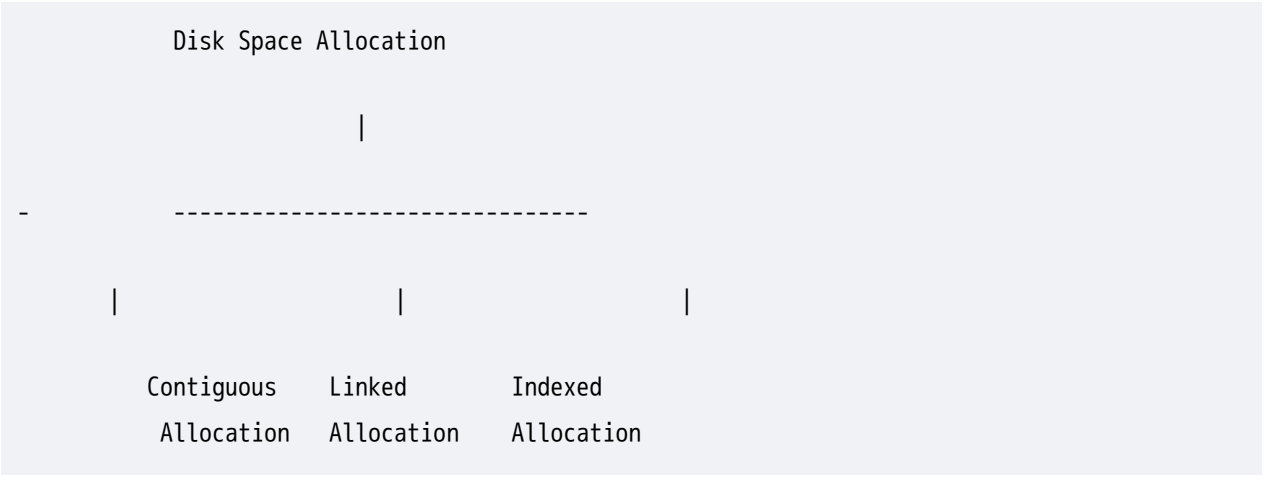
✅ Fast Access

✅ Efficient Storage

✅ Better Performance

Types of Disk Space Allocation Methods

⭐⭐⭐⭐⭐ EXAM DIAGRAM



---

1. Contiguous Allocation

⭐⭐⭐⭐⭐ MOST IMPORTANT

Definition

File ke saare blocks disk me continuous locations par store kiye jate hain.

Diagram

```
File A

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

| 10 | 11 | 12 | 13 | 14 |

            ---------------------------
```

Example

Suppose file size = 5 blocks

Disk Allocation:

```
Block 10

Block 11

Block 12

Block 13

           Block 14
```

Advantages

1. Simple Implementation

2. Fast Sequential Access

3. Fast Direct Access

4. High Performance

Disadvantages

1. External Fragmentation

2. File Size Predict Karna Padta Hai

3. Space Wastage

Real Life Example

Train me continuous seats milna.

```
Seat 10

Seat 11

Seat 12

          Seat 13
```

---

2. Linked Allocation

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Definition

File ke blocks disk me kahi bhi store ho sakte hain.

Har block next block ka address store karta hai.

Diagram

```
Block 5 → Block 20 → Block 7 → Block 35 → NULL
```

Visual Diagram

```
File A

[5] → [20] → [7] → [35] → NULL
```

Working

OS first block ka address rakhta hai.

Har block next block ka pointer rakhta hai.

Advantages

1. No External Fragmentation

2. Dynamic File Growth

3. Efficient Space Utilization

Disadvantages

1. Slow Random Access

2. Pointer Overhead

3. Pointer Corruption Risk

Real Life Example

Treasure Hunt

```
Clue 1 → Clue 2 → Clue 3
```

---

3. Indexed Allocation

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Definition

Har file ke liye ek index block maintain kiya jata hai.

Index block me file ke saare data blocks ke addresses stored hote hain.

Diagram

```
Index Block

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

10

25

40

55

70

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

      |
```

```
      |

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

Data Blocks

   10

               25

              40

              55

             70

        ----------------
```

Working

Step 1

Index Block Create

Step 2

Saare block addresses index me store

Step 3

OS index block se direct access karta hai.

Advantages

1. Direct Access Possible

2. No External Fragmentation

3. Fast Access

4. Flexible Allocation

Disadvantages

1. Extra Index Block Required

2. Space Overhead

3. Large Files Need Multiple Indexes

Real Life Example

Book Index

```
Chapter 1 → Page 10

Chapter 2 → Page 25

Chapter 3 → Page 40
```

Comparison Table

⭐⭐⭐⭐⭐⭐ EXAM FAVOURITE

Feature	Contiguous	Linked	Indexed
Storage	Continuous	Scattered	Scattered
Direct Access	Yes	No	Yes

Sequential Access	Fast	Fast	Fast
External Fragmentation	Yes	No	No
Random Access	Fast	Slow	Fast
Pointer Required	No	Yes	Yes (Index Block)
Implementation	Simple	Moderate	Complex
Performance	High	Medium	High

Allocation Methods Diagram

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

```
Contiguous

10 11 12 13 14


Linked

10 → 25 → 7 → 50


Indexed

Index

↓

10

          25

          7

         50
```

Advantages of Disk Allocation Methods

Efficient Storage

Fast Access

Better Space Utilization

Organized File Storage

Viva Questions

Q1. What is Disk Space Allocation?

Method of allocating disk blocks.

Q2. Name the allocation methods.

Contiguous, Linked, Indexed.

Q3. Which allocation suffers from fragmentation?

Contiguous Allocation.

Q4. Which allocation uses pointers?

Linked Allocation.

Q5. Which allocation uses index block?

Indexed Allocation.

Frequently Asked RGPV Questions

---

7 Marks

1. Compare Contiguous and Linked Allocation.
2. Explain Indexed Allocation with diagram.
3. Explain Disk Space Allocation Methods.

---

14 Marks

Q. Explain Disk Space Allocation Methods with neat diagrams.

Q. Compare Contiguous, Linked and Indexed Allocation.

Q. Explain various file allocation methods used in Operating Systems.

PYQ Trend Analysis

Topic	Frequency
Contiguous Allocation	⭐⭐⭐⭐⭐
Linked Allocation	⭐⭐⭐⭐⭐
Indexed Allocation	⭐⭐⭐⭐⭐
Comparison Table	⭐⭐⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain Disk Space Allocation Methods.

🔥 Compare Contiguous, Linked and Indexed Allocation.

🔥 Explain Indexed Allocation with diagram.

🔥 Discuss advantages and disadvantages of Linked Allocation.

🔥 Which file allocation method is best? Justify.

One-Minute Revision

```
Disk Space Allocation

           ↓

1. Contiguous
   - Continuous Blocks
   - Fast
   - Fragmentation

2. Linked
   - Pointer Based
   - No Fragmentation
              - Slow Random Access

            3. Indexed
             - Index Block
              - Fast Access
             - Extra Space Needed
```

Memory Trick: CLI

```
C → Contiguous

L → Linked

          I → Indexed
```

🎯 **Exam Tip:** Is topic me **Comparison Table of Contiguous vs Linked vs Indexed Allocation** sabse important hai. Agar diagram + advantages/disadvantages + comparison table bana diya to 14 marks ka answer easily full score la sakta hai. 🚀📚

Directory Structure:-

Introduction

File System me files ko organize karne ke liye directories (folders) ka use kiya jata hai.

Directory ek special file hoti hai jo files aur subdirectories ki information store karti hai.

Directory Structure batata hai ki files aur folders ka arrangement kaise kiya gaya hai.

Definition

"Directory Structure is the logical organization of files and directories in a file system."

Need of Directory Structure

Without Directory:

❌ Files search karna difficult

❌ Data management difficult

❌ File name conflicts

With Directory:

✅ Easy Organization

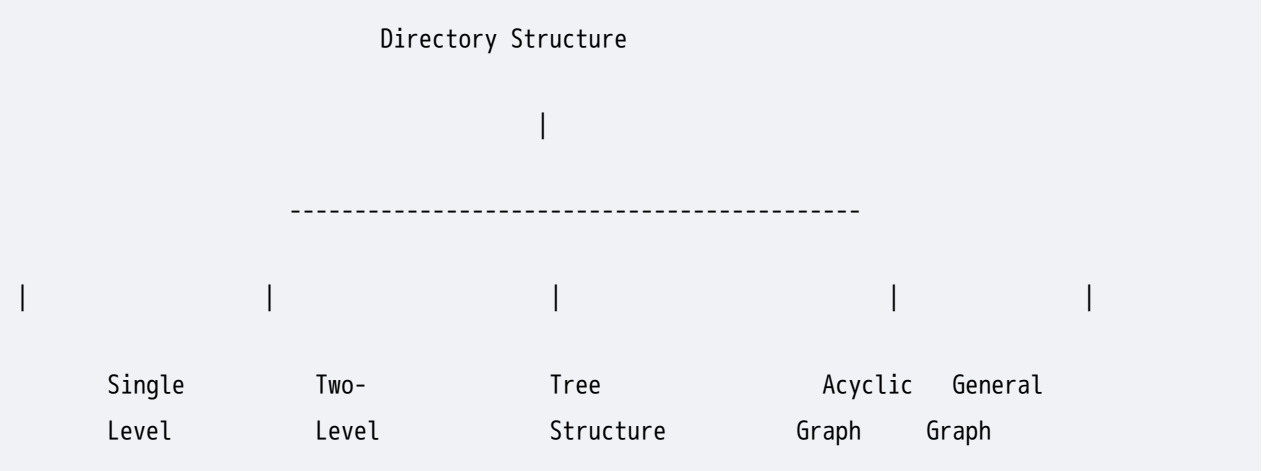
✅ Fast Searching

✅ Better Security

✅ Efficient Management

Directory Structure Types

⭐⭐⭐⭐⭐ EXAM DIAGRAM



---

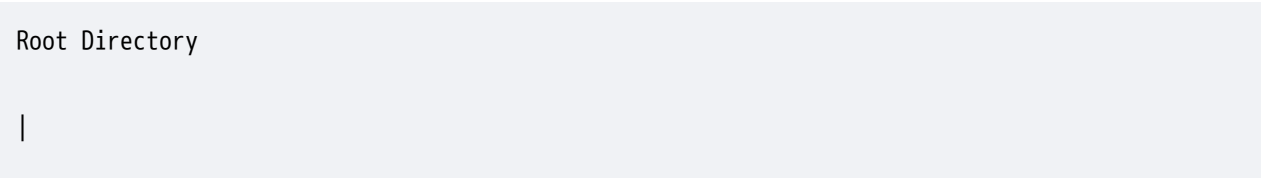
1. Single-Level Directory Structure

⭐⭐⭐⭐⭐ Frequently Asked

Definition

System ki saari files ek hi directory me store hoti hain.

Diagram



```
--------------------------------

File1

File2

          File3

         File4
```

Example

```
Notes.pdf

Marks.doc

Photo.jpg
```

sab ek hi directory me.

Advantages

✔ Very Simple

✔ Easy Implementation

Disadvantages

❌ File Name Conflict

❌ Difficult Searching

❌ Not Suitable for Large Systems

---

2. Two-Level Directory Structure

⭐⭐⭐⭐⭐ Important

Definition

Har user ki apni separate directory hoti hai.

Diagram

```
Root Directory

        |

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

|                   |

User A          User B

|                 |

         File1           File3

         File2           File4
```

Advantages

✔ No File Name Conflict

✔ Better Security

Disadvantages

❌ Limited Sharing

❌ More Complex

---

3. Tree Structured Directory

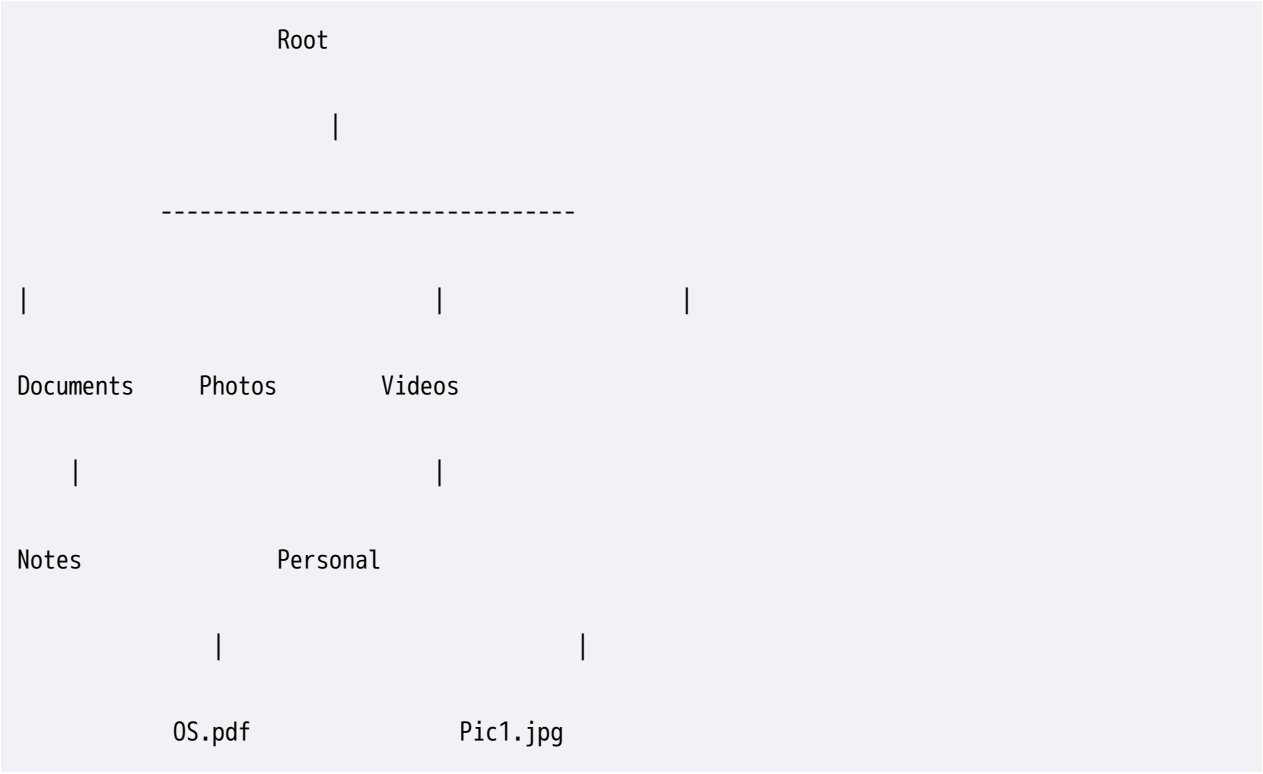
⭐⭐⭐⭐⭐ MOST IMPORTANT

Definition

Directories aur subdirectories tree structure me organized hoti hain.

Diagram

⭐⭐⭐⭐⭐ EXAM DIAGRAM



Characteristics

✔ Hierarchical Structure

✔ Multiple Levels

✔ Easy Navigation

Advantages

Better Organization

Easy Searching

Flexible Structure

Widely Used

Disadvantages

Slightly Complex

Example

Windows File System

```
C:\

↓

Documents

↓

College
```

```
          ↓

        OS Notes.pdf
```

---

4. Acyclic Graph Directory Structure

⭐⭐⭐⭐⭐ Important

Definition

Files aur directories ko multiple users share kar sakte hain.

Cycles allow nahi hoti.

Diagram

```
         Root

        /    \

     UserA  UserB

        \   /

             Shared Folder
```

Characteristics

✔ File Sharing

✔ No Cycles

✔ Resource Saving

Advantages

Better Sharing

No Data Duplication

Disadvantages

Management Difficult

---

5. General Graph Directory Structure

⭐⭐⭐⭐ Frequently Asked

Definition

Acyclic Graph ka extended version hai.

Cycles allowed hoti hain.

Diagram

```
Directory A

      |

Directory B

      |

Directory C
```

```
    |

    ------

              |

             A
```

Cycle create ho gayi.

Advantages

Maximum Flexibility

Better Sharing

Disadvantages

Infinite Loop Problem

Complex Searching

Comparison Table

⭐⭐⭐⭐⭐⭐ EXAM FAVOURITE

Structure	Sharing	Complexity	Suitable For
Single Level	No	Very Low	Small Systems
Two Level	Limited	Low	Multi User Systems

Tree Structure	Moderate	Medium	Modern OS
Acyclic Graph	Yes	High	Shared Systems
General Graph	Maximum	Very High	Advanced Systems

Tree vs Graph Structure

⭐⭐⭐⭐ Frequently Asked

Tree Structure	**Graph Structure**
No Sharing	Sharing Possible
Simple	Complex
No Cycles	Cycles Possible
Easy Search	Difficult Search

Real Life Example

Tree Structure

```
College

↓

Department

↓

Student

              ↓

           Notes
```

Graph Structure

```
Shared Google Drive Folder

↓

        Many Users Access
```

Advantages of Directory Structure

Easy File Management

Better Organization

Fast Searching

Improved Security

Resource Sharing

Viva Questions

Q1. What is a Directory?

Special file containing file information.

Q2. What is Directory Structure?

Organization of files and folders.

Q3. Which structure is most widely used?

Tree Structured Directory.

Q4. Which structure supports sharing?

Acyclic Graph Structure.

Q5. Which structure allows cycles?

General Graph Directory.

Frequently Asked RGPV Questions

---

7 Marks

1. Explain Directory Structures.
2. Compare Tree and Graph Directory.
3. Explain Acyclic Graph Directory.

---

14 Marks

Q. Explain different Directory Structures with neat diagrams.

Q. Explain Single Level, Two Level and Tree Structured Directory.

Q. Compare different Directory Structures used in Operating Systems.

PYQ Trend Analysis

Topic	Frequency
Tree Structure	⭐⭐⭐⭐⭐⭐

Single Level	⭐⭐⭐⭐⭐
Two Level	⭐⭐⭐⭐
Acyclic Graph	⭐⭐⭐⭐
Comparison Table	⭐⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain different Directory Structures.

🔥 Explain Tree Structured Directory with diagram.

🔥 Compare Single Level and Two Level Directory.

🔥 Explain Acyclic Graph Directory.

🔥 Compare all Directory Structures.

One-Minute Revision

```
Directory Structures

↓

1. Single Level
2. Two Level
3. Tree Structure
          4. Acyclic Graph
         5. General Graph
```

Memory Trick: STTAG

```
S → Single Level

T → Two Level
```

```
T → Tree Structure

A → Acyclic Graph

            G → General Graph
```

🎯 **Exam Tip:** Directory Structures ke question me **5 diagrams** banana sabse important hai. Sirf diagrams + advantages/disadvantages + comparison table likh do to 14 marks ka answer aasani se 4 pages bhar dega aur full marks mil sakte hain. 🚀📚

File Protection:-

Introduction

Computer system me files bahut important information store karti hain.

Agar koi unauthorized user files ko access, modify ya delete kar de to data loss ho sakta hai.

Isliye Operating System files ko protect karne ke liye protection mechanisms provide karta hai.

Definition

"File Protection is the mechanism used by an Operating System to prevent unauthorized access, modification, deletion and misuse of files."

Need of File Protection

Without Protection:

❌ Data Theft

❌ Data Corruption

❌ Unauthorized Modification

❌ Accidental Deletion

With Protection:

✅ Data Security

✅ Controlled Access

✅ User Privacy

✅ Safe Data Storage

Objectives of File Protection

⭐⭐⭐⭐⭐ Frequently Asked

1. Prevent Unauthorized Access

2. Maintain Data Integrity

3. Ensure Data Confidentiality

4. Provide Controlled Sharing

5. Protect Against Accidental Damage

File Protection Mechanism

⭐⭐⭐⭐⭐⭐ EXAM DIAGRAM

```
                File Protection

                        |

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

Access Rights

Passwords

Access Matrix

          User Authentication

         Permissions
```

Access Rights

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Operating System different users ko different permissions deta hai.

Common Access Rights

Read (R)

File ko sirf dekh sakte hain.

Write (W)

File modify kar sakte hain.

Execute (X)

Program run kar sakte hain.

Append (A)

File ke end me data add kar sakte hain.

Delete (D)

File remove kar sakte hain.

Diagram

```
File

 |

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

Read

Write

         Execute

        Delete
```

Example

```
OS_Notes.pdf

Permission:

Read = Yes

Write = No

          Delete = No
```

Access Control Matrix

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Access Control Matrix users aur files ke permissions show karti hai.

Example

User	File A	File B
User1	R,W	R
User2	R	R,W
Admin	R,W,X,D	R,W,X,D

Diagram

```
                Files

               A      B

User1  R,W     R

           User2     R     R,W
```

Advantages

✔ Easy Permission Management

✔ Better Security

Password Protection

⭐⭐⭐⭐⭐ Important

Files ko password ke through secure kiya ja sakta hai.

Working

```
User

 ↓

Password

 ↓

        File Access
```

Example

```
PDF Password

ZIP Password
```

User Authentication

Authentication verify karta hai ki user genuine hai ya nahi.

Methods

Username & Password

OTP

Fingerprint

Face Recognition

Diagram

```
User

  ↓

Authentication

  ↓

      File Access
```

File Permissions in UNIX/Linux

⭐⭐⭐⭐⭐⭐ EXAM FAVOURITE

UNIX me permissions 3 categories ke liye define hoti hain.

Categories

Owner

Group

Others

Permission Diagram

```
rwx rwx rwx

 |   |   |

Owner

Group

           Others
```

Example

```
rwx r-x r--
```

Meaning:

```
Owner → Read Write Execute

Group → Read Execute

          Others → Read Only
```

File Encryption

⭐⭐⭐⭐⭐ Important

Sensitive files ko encrypted form me store kiya jata hai.

Diagram

```
Original File

      ↓

Encryption

      ↓

          Encrypted File
```

Advantages

✔ Better Security

✔ Data Privacy

Disadvantages

✔ Extra Processing Time

File Protection Domain

Protection Domain define karta hai ki user kya access kar sakta hai.

Example

```
Student

↓

Read Notes
```

```
        Cannot Modify
```

Protection Layers

⭐⭐⭐⭐ Frequently Asked

```
User Authentication

↓

Access Rights

↓

File Permissions

            ↓

         Encryption
```

Advantages of File Protection

1. Data Security

2. User Privacy

3. Controlled Sharing

4. Prevent Data Loss

5. Improved Reliability

Disadvantages

1. Management Complexity

2. Additional Overhead

3. Password Loss Problem

Real Life Example

Suppose bank locker hai.

```
Locker = File

Key = Password

           Bank Manager = Operating System
```

Har koi locker access nahi kar sakta.

Access Rights vs Authentication

⭐⭐⭐⭐⭐ EXAM TABLE

Access Rights	Authentication
Defines Permission	Verifies User
Read, Write, Execute	Username, Password
Controls Actions	Controls Access
After Login	Before Login

Viva Questions

Q1. What is File Protection?

Protection of files from unauthorized access.

Q2. Why is File Protection required?

To secure data.

Q3. What are access rights?

Permissions on files.

Q4. What is Access Matrix?

Table showing permissions.

Q5. What is Authentication?

User verification process.

Frequently Asked RGPV Questions

---

7 Marks

1. Explain File Protection Mechanisms.
2. Explain Access Control Matrix.
3. Explain UNIX File Permissions.

---

14 Marks

Q. Explain File Protection with neat diagram.

Q. Explain various file protection methods used in Operating Systems.

Q. Explain Access Rights, Access Matrix and Authentication.

PYQ Trend Analysis

Topic	Frequency
File Protection	⭐⭐⭐⭐⭐
Access Rights	⭐⭐⭐⭐⭐
Access Matrix	⭐⭐⭐⭐⭐
UNIX Permissions	⭐⭐⭐⭐
Authentication	⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain File Protection with diagram.

🔥 Explain Access Control Matrix.

🔥 Explain UNIX/Linux file permissions.

🔥 Explain Authentication and Access Rights.

🔥 Discuss various File Protection Mechanisms.

One-Minute Revision

```
File Protection

↓

Authentication

↓

Access Rights

↓

Access Matrix

↓

         Permissions

            ↓

       Encryption
```

Memory Trick: AAPPE

```
A → Authentication

A → Access Rights

P → Permissions

P → Protection Domain

           E → Encryption
```

🎯 **Exam Tip:** File Protection ke answer me **Access Matrix diagram + UNIX Permission diagram (rwx rwx rwx)** zarur banao. Ye examiner ko impress karta hai aur 14 marks ka answer easily 3–4 pages tak bhar deta hai. 🚀📚

System Calls for File Management:-

Introduction

User programs directly files ko access nahi kar sakte.

File operations perform karne ke liye Operating System **System Calls** provide karta hai.

System Calls user program aur Operating System ke beech interface ka kaam karte hain.

Definition

"File Management System Calls are operating system services that allow user programs to create, access, modify and manage files."

Why System Calls are Needed?

Without System Calls:

❌ Direct Hardware Access

❌ Security Problems

❌ Difficult File Management

With System Calls:

✅ Secure File Access

✅ Controlled Operations

✅ Easy File Management

Diagram

⭐⭐⭐⭐⭐ EXAM DIAGRAM

```
User Program

      |

System Call

      |

Operating System

      |

File System

               |

           Disk
```

Major File Management System Calls

⭐⭐⭐⭐⭐ MOST IMPORTANT

```
1. Create()

2. Open()

3. Read()

4. Write()

5. Close()

6. Delete()

7. Rename()
```

```
 8. Reposition()

 9. Get Attributes()

10. Set Attributes()
```

---

1. Create() System Call

⭐⭐⭐⭐⭐ Frequently Asked

Purpose

New file create karne ke liye use hota hai.

Working

```
User

 ↓

Create File

 ↓

      OS Creates File
```

Example

```
create("student.txt");
```

Advantages

✔ New File Creation

✔ Easy Storage Management

---

2. Open() System Call

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Purpose

Existing file ko access karne ke liye.

Working

```
File

  ↓

Open()

  ↓

       Ready for Access
```

Example

```
open("notes.txt");
```

Advantages

✔ File Access

✔ File Reading/Writing

---

3. Read() System Call

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Purpose

File se data read karne ke liye.

Diagram

```
File

  ↓

Read()

  ↓

        Memory
```

Example

```
read(fd,buffer,size);
```

Advantages

✔ Data Retrieval

✔ Fast Access

---

4. Write() System Call

⭐⭐⭐⭐⭐ MOST IMPORTANT

Purpose

File me data store karne ke liye.

Diagram

```
Memory

  ↓

Write()

  ↓

          File
```

Example

```
write(fd,data,size);
```

Advantages

✔ Data Storage

✔ Data Modification

---

5. Close() System Call

⭐⭐⭐⭐⭐ Important

Purpose

File access complete hone ke baad file close karna.

Example

```
close(fd);
```

Advantages

✔ Resource Release

✔ Better Security

---

6. Delete() System Call

⭐⭐⭐⭐ Frequently Asked

Purpose

File ko permanently remove karna.

Diagram

```
File

  ↓

Delete()

  ↓

        Removed
```

Example

```
remove("file.txt");
```

---

7. Rename() System Call

Purpose

File ka naam change karna.

Example

```
rename("old.txt","new.txt");
```

Working

```
Old Name

  ↓

Rename()

  ↓

        New Name
```

---

8. Reposition() System Call

⭐⭐⭐⭐ Important

Purpose

File pointer ko new location par move karna.

Example

```
lseek(fd,offset,SEEK_SET);
```

Diagram

```
File

Pointer

  ↓

      Position Change
```

Advantages

✔ Random Access

✔ Fast Searching

---

9. Get Attributes() System Call

Purpose

File ki properties retrieve karna.

Attributes

```
Name

Size

Type

Date

       Permissions
```

Example

```
stat("file.txt");
```

---

10. Set Attributes() System Call

Purpose

File attributes modify karna.

Example

```
chmod()
```

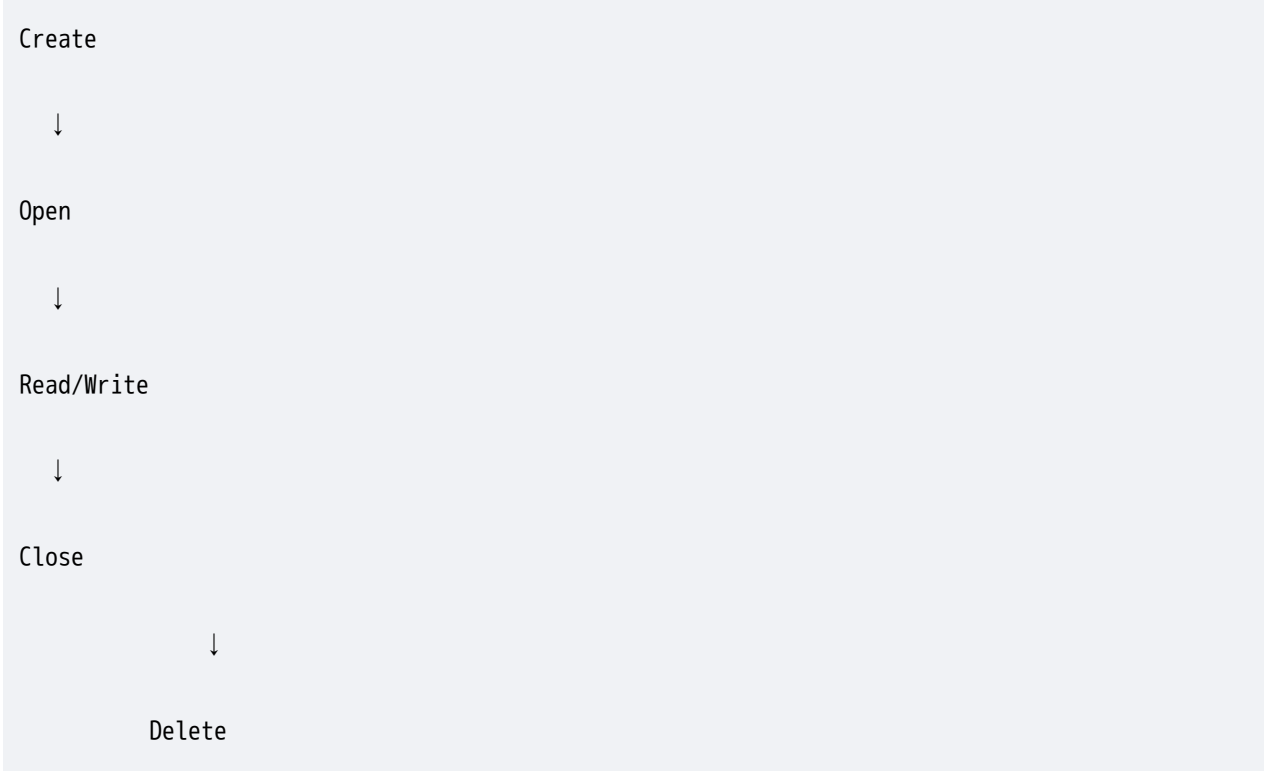
Uses

✔ Change Permissions

✔ Update Attributes

File Operation Flow

⭐⭐⭐⭐⭐ EXAM DIAGRAM



Summary Table

⭐⭐⭐⭐⭐ EXAM FAVOURITE

System Call	Function
Create()	Create File
Open()	Open File
Read()	Read Data
Write()	Write Data
Close()	Close File
Delete()	Delete File
Rename()	Rename File
Reposition()	Move Pointer

Get Attributes()	Retrieve Properties
Set Attributes()	Modify Properties

Advantages of File Management System Calls

Easy File Handling

Better Security

Controlled Access

Efficient Resource Management

Data Integrity

Real Life Example

Suppose notebook use kar rahe ho:

```
Create → New Notebook

Open → Open Notebook

Write → Write Notes

Read → Read Notes

Close → Close Notebook

          Delete → Throw Notebook
```

Viva Questions

Q1. What is a System Call?

Interface between user program and OS.

Q2. What is Open() used for?

Opening a file.

Q3. What is Read()?

Reading data from file.

Q4. What is Write()?

Writing data into file.

Q5. What is Close()?

Closing an opened file.

Frequently Asked RGPV Questions

---

7 Marks

1. Explain major File Management System Calls.
2. Explain File Operation Flow.
3. Explain Reposition() and Attribute Calls.

---

14 Marks

Q. Explain System Calls for File Management with suitable examples.

Q. Discuss various File Management System Calls used in Operating Systems.

Q. Explain Create(), Open(), Read(), Write(), Close() and Delete() System Calls.

PYQ Trend Analysis

Topic	Frequency
Open()	⭐⭐⭐⭐⭐
Read()	⭐⭐⭐⭐⭐
Write()	⭐⭐⭐⭐⭐
Close()	⭐⭐⭐⭐
Complete File System Calls	⭐⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain System Calls for File Management.

🔥 Explain Open(), Read(), Write() and Close().

🔥 Explain File Operation Flow.

🔥 Explain Attribute System Calls.

🔥 Explain Reposition() with example.

One-Minute Revision

```
File Management System Calls

↓

Create()

Open()

Read()

Write()

Close()

Delete()

Rename()

          Reposition()

         Get Attributes()

        Set Attributes()
```

Memory Trick: CORWCDRGS

```
C → Create
O → Open
R → Read
W → Write
C → Close
D → Delete
          R → Rename
          G → Get Attributes
          S → Set Attributes
```

🎯 **Exam Tip:** Is answer me **File Operation Flow Diagram (Create → Open → Read/Write → Close → Delete)** aur **Summary Table** zarur banao. Ye 14 marks ke answer ko complete

banata hai aur examiner ko impress karta hai. 🚀📚

Disk Scheduling Algorithms:-

Introduction

Hard Disk me bahut saari I/O requests aati hain.

Operating System ko decide karna hota hai ki kis request ko pehle service di jaye.

Requests ko schedule karne ki technique ko:

```
Disk Scheduling Algorithm
```

kehte hain.

Definition

"Disk Scheduling Algorithm is a method used by the Operating System to determine the order in which disk I/O requests are serviced."

Need of Disk Scheduling

Without Scheduling:

❌ High Seek Time

❌ Slow Performance

❌ More Waiting Time

With Scheduling:

✅ Fast Disk Access

✅ Reduced Seek Time

✅ Better Throughput

✅ Improved Performance

Disk Scheduling Diagram

⭐⭐⭐⭐⭐ EXAM DIAGRAM

```
Disk Requests

      ↓

Disk Scheduling Algorithm

      ↓

Order of Execution

              ↓

          Disk Access
```

Important Terms

Seek Time

⭐⭐⭐⭐⭐ MOST IMPORTANT

Time required to move disk head from one track to another.

Rotational Latency

Time required for desired sector to come under the read/write head.

Transfer Time

Actual time required to transfer data.

Types of Disk Scheduling Algorithms

⭐⭐⭐⭐⭐ EXAM DIAGRAM

```
Disk Scheduling

      |

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

FCFS

SSTF

SCAN

C-SCAN

         LOOK

        C-LOOK
```

---

1. FCFS (First Come First Serve)

⭐⭐⭐⭐⭐ MOST IMPORTANT

Definition

Requests are served in the order they arrive.

Example

Request Queue:

```
98, 183, 37, 122, 14
```

Execution:

```
98 → 183 → 37 → 122 → 14
```

Diagram

```
Request1

   ↓

Request2

   ↓

         Request3
```

Advantages

✔ Simple

✔ Fair

✔ Easy Implementation

Disadvantages

❌ High Seek Time

❌ Poor Performance

---

2. SSTF (Shortest Seek Time First)

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Definition

Nearest request ko pehle service diya jata hai.

Example

Current Head = 50

Requests:

```
10, 55, 70, 90
```

Nearest:

```
55
```

pehle execute hoga.

Working

```
Current Position
```

```
↓

Nearest Request

↓

        Execute
```

Advantages

✔ Reduced Seek Time

✔ Better Performance

Disadvantages

❌ Starvation Possible

❌ Complex

---

3. SCAN Algorithm

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Definition

Disk Head ek direction me move karta hai aur saari requests serve karta hai.

End par pahunchkar direction reverse karta hai.

Diagram

```
0 ---------------------- 199

→ → → → → → →

          ← ← ← ← ← ← ←
```

Why Called Elevator Algorithm?

Lift ki tarah kaam karta hai.

Advantages

✔ Better Throughput

✔ Reduced Waiting Time

Disadvantages

❌ End Tracks ko zyada wait karna pad sakta hai.

---

4. C-SCAN (Circular SCAN)

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Definition

SCAN jaisa hi hai.

Difference:

Head reverse nahi hota.

End par pahunchkar directly start par aa jata hai.

Diagram

```
0 ------------------ 199

→ → → → → → →

Jump

↓

          0
```

Advantages

✔ Uniform Waiting Time

✔ Fair Scheduling

Disadvantages

❌ Extra Head Movement

---

5. LOOK Algorithm

⭐⭐⭐⭐⭐ Frequently Asked

Definition

SCAN ka improved version.

Head disk ke end tak nahi jata.

Last request tak hi move karta hai.

Diagram

```
Request Range

↓

Move

↓

Last Request

            ↓

          Reverse
```

Advantages

✔ Less Seek Time

✔ Efficient

Disadvantages

❌ Slightly Complex

---

6. C-LOOK Algorithm

⭐⭐⭐⭐⭐ Important

Definition

C-SCAN ka improved version.

Head only last request tak move karta hai.

Diagram

```
Requests

↓

Move Forward

↓

Last Request

          ↓

      Jump to First Request
```

Advantages

✔ Less Head Movement

✔ Better Performance

Comparison Table

⭐⭐⭐⭐⭐⭐ EXAM FAVOURITE

Algorithm	Seek Time	Starvation	Complexity

FCFS	High	No	Simple
SSTF	Low	Yes	Medium
SCAN	Medium	No	Medium
C-SCAN	Medium	No	Medium
LOOK	Low	No	High
C-LOOK	Lowest	No	High

FCFS vs SSTF

⭐⭐⭐⭐⭐ Important

FCFS	**SSTF**
Arrival Order	Nearest Request
Simple	Efficient
High Seek Time	Low Seek Time
No Starvation	Starvation Possible

SCAN vs C-SCAN

⭐⭐⭐⭐⭐ Important

SCAN	**C-SCAN**
Moves Both Directions	One Direction
Elevator Model	Circular Model

Non-Uniform Waiting	Uniform Waiting

Advantages of Disk Scheduling

Reduced Seek Time

Better Throughput

Faster Disk Access

Improved Performance

Efficient Resource Utilization

Real Life Example

Suppose lift hai.

FCFS

Jo pehle button dabayega us floor par lift jayegi.

SSTF

Sabse nearest floor par pehle jayegi.

SCAN

Lift upar jayegi, sab floors cover karegi, fir niche aayegi.

C-SCAN

Lift sirf upar jayegi aur fir direct ground floor par aa jayegi.

Viva Questions

Q1. What is Disk Scheduling?

Method of servicing disk requests.

Q2. What is Seek Time?

Time to move head to desired track.

Q3. Which algorithm is simplest?

FCFS.

Q4. Which algorithm may cause starvation?

SSTF.

Q5. Why is SCAN called Elevator Algorithm?

Because it works like an elevator.

Frequently Asked RGPV Questions

---

7 Marks

1. Compare FCFS and SSTF.
2. Compare SCAN and C-SCAN.

3. Explain LOOK and C-LOOK.

---

14 Marks

Q. Explain Disk Scheduling Algorithms with neat diagrams.

Q. Compare FCFS, SSTF, SCAN and C-SCAN.

Q. Explain various Disk Scheduling Algorithms used in Operating Systems.

PYQ Trend Analysis

Topic	Frequency
FCFS	⭐⭐⭐⭐⭐
SSTF	⭐⭐⭐⭐⭐
SCAN	⭐⭐⭐⭐⭐⭐
C-SCAN	⭐⭐⭐⭐⭐
Comparison Tables	⭐⭐⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain Disk Scheduling Algorithms.

🔥 Compare FCFS and SSTF.

🔥 Explain SCAN and C-SCAN with diagrams.

🔥 Explain LOOK and C-LOOK.

🔥 Which Disk Scheduling Algorithm is best? Justify.

One-Minute Revision

```
Disk Scheduling Algorithms

↓

FCFS
SSTF
SCAN
         C-SCAN
         LOOK
         C-LOOK
```

Memory Trick: FSSCLC

```
F → FCFS

S → SSTF

S → SCAN

C → C-SCAN

L → LOOK

          C → C-LOOK
```

🎯 **Exam Tip:** Disk Scheduling Algorithms ke answer me **FCFS, SSTF, SCAN, C-SCAN ke diagrams aur comparison tables** zarur banao. RGPV me ye topic sabse zyada repeat hota hai aur 14 marks ka pakka question ban sakta hai. 🚀📚