UNIT-1 : INTRODUCTION TO OPERATING SYSTEM (NOTES WITH EASY EXPLAINATION)

⭐⭐⭐⭐⭐ Most Important | 🔥 Frequently Asked | ✅ Easy Marks Topic

> RGPV Exam View:
>
> Unit-1 se har saal 10–20 marks ke questions aate hain.
>
> Ye pura subject ka foundation hai.

UNIT OVERVIEW

Weightage

⭐⭐⭐⭐

10–15 Marks

Most Repeated Questions

🔥 Define Operating System.

🔥 Functions of Operating System.

🔥 Types of Operating Systems.

🔥 System Calls.

🔥 Operating System Services.

🔥 Evolution of Operating Systems.

Study Priority

```
OS Introduction
       ↓
Functions
       ↓
Types of OS
       ↓
            Services
                 ↓
       System Calls
```

OPERATING SYSTEM (OS)

Introduction

Computer System ke do main parts hote hain:

```
Hardware

Software
```

Hardware directly user ki language nahi samajhta.

Isliye ek mediator chahiye.

Yahi Operating System hai.

Definition

Exam Definition

"Operating System is system software that acts as an interface between the user and computer hardware and manages all system resources efficiently."

Block Diagram

⭐⭐⭐⭐⭐ Exam Diagram

```
       USER
         |
         |
         V

----------------
| Operating    |
|   System     |
----------------

         |
                   |
                  V

          ----------------
         | Hardware      |
          ----------------
```

Real Life Example

Suppose:

```
You         =                     User

Manager =               Operating System

Workers =                          Hardware
```

Aap directly workers ko order nahi dete.

Manager ke through kaam hota hai.

Why OS is Required?

Without OS:

❌ Computer difficult to use

❌ No resource management

❌ No multitasking

❌ No file management

With OS:

✅ Easy to use

✅ Fast execution

✅ Resource management

✅ Security

Functions of Operating System:-

Introduction

Operating System (OS) computer ka sabse important system software hai jo user aur hardware ke beech interface ka kaam karta hai.

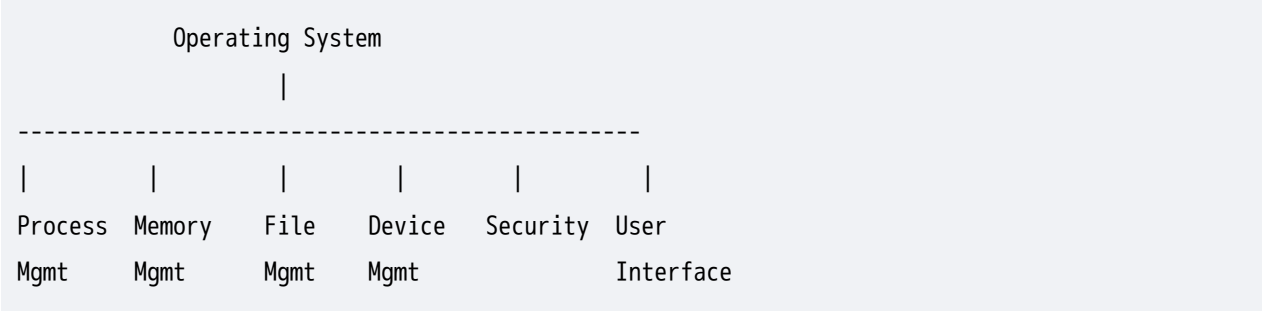
OS ka main kaam computer resources ko efficiently manage karna hai.

Definition

"Functions of an Operating System are the various tasks performed by the OS to manage hardware resources, software resources and provide services to users."

Diagram of Functions of OS

⭐⭐⭐⭐⭐ Exam Diagram



---

1. Process Management

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Process = Program in Execution

OS processes ko create, execute aur terminate karta hai.

Functions

✔ Process Creation

✔ Process Scheduling

✔ Process Termination

✔ CPU Allocation

Example

```
Chrome

MS Word

          VLC Player
```

Sabhi ko CPU time OS provide karta hai.

---

2. Memory Management

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

OS RAM ko manage karta hai.

Functions

✔ Memory Allocation

✔ Memory Deallocation

✔ Memory Protection

✔ Virtual Memory Management

Diagram

```
RAM

------------------
Program A
Program B
            Program C
          ------------------
```

OS decide karta hai kisko kitni memory milegi.

---

3. File Management

⭐⭐⭐⭐⭐ IMPORTANT

OS files aur folders ko manage karta hai.

Functions

✔ Create File

✔ Delete File

✔ Rename File

✔ Copy File

✔ Move File

Example

```
Documents

Photos

Videos
```

Sab OS manage karta hai.

---

4. Device Management

⭐⭐⭐⭐⭐ IMPORTANT

OS input/output devices ko control karta hai.

Devices

```
Keyboard

Mouse

Printer

           Scanner
```

Functions

✔ Device Allocation

✔ Device Scheduling

✔ Driver Management

---

5. Secondary Storage Management

Hard Disk aur SSD ko manage karta hai.

Functions

✔ Disk Space Allocation

✔ Free Space Management

✔ Disk Scheduling

---

6. Security and Protection

⭐⭐⭐⭐ Frequently Asked

OS unauthorized access ko rokta hai.

Functions

✔ User Authentication

✔ Password Protection

✔ Access Control

✔ Data Security

---

7. User Interface

OS user aur hardware ke beech interface provide karta hai.

Types

CLI

Command Line Interface

Example:

```
MS-DOS
```

GUI

Graphical User Interface

Example:

```
Windows
Linux
```

---

8. Resource Allocation

OS system resources allocate karta hai.

Resources

```
CPU

Memory

Printer

           Disk
```

---

9. Error Detection

OS errors detect karta hai.

Examples

```
Memory Error

Disk Error

          Device Error
```

---

10. Accounting

OS resource usage track karta hai.

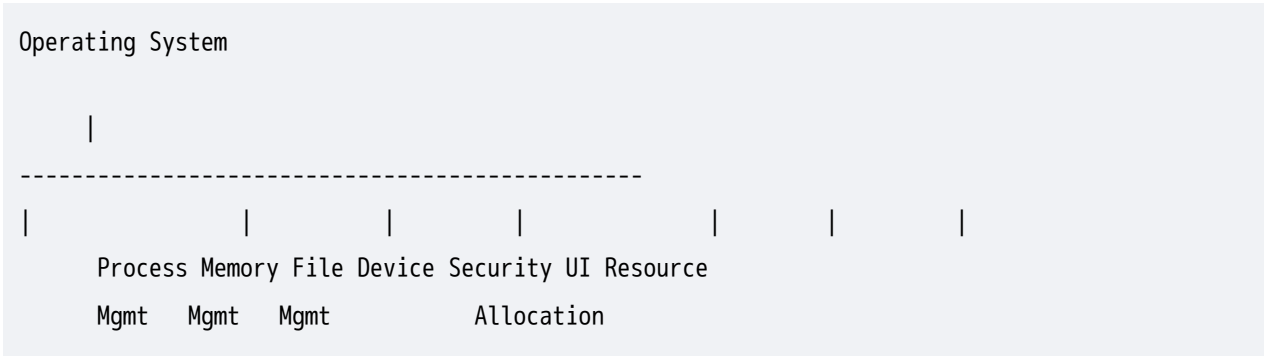
Example

```
CPU Usage

Memory Usage

Disk Usage
```

Summary Diagram



Advantages of OS Functions

1. Efficient Resource Utilization

2. Fast Processing

3. Better Security

4. Easy User Interaction

5. Multitasking Support

Viva Questions

Q1. What is Process Management?

Managing processes in execution.

Q2. What is Memory Management?

Managing RAM allocation.

Q3. What is File Management?

Managing files and directories.

Q4. What is Device Management?

Managing I/O devices.

Q5. Why is Security required?

To protect data from unauthorized access.

---

7 Marks

1. Explain major functions of Operating System.
2. Discuss Memory and File Management.
3. Explain Device Management and Security.

---

14 Marks

Q. Explain various functions of Operating System with neat diagram.

PYQ Trend Analysis

Topic	Frequency
Functions of OS	⭐⭐⭐⭐⭐
Process Management	⭐⭐⭐⭐⭐
Memory Management	⭐⭐⭐⭐⭐
File Management	⭐⭐⭐⭐

Device Management	⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain Functions of Operating System.

🔥 Explain Process Management in OS.

🔥 Explain Memory Management in Operating System.

🔥 Discuss File and Device Management.

🔥 Explain Security functions of Operating System.

One-Minute Revision

```
Functions of OS

1. Process Management
2. Memory Management
3. File Management
4. Device Management
5. Security
6. User Interface
          7. Resource Allocation
          8. Error Detection
         9. Accounting
10. Secondary Storage Management
```

Memory Trick

PMFD-SURAEA

```
P → Process Management
M → Memory Management
F → File Management
D → Device Management
S → Security
U → User Interface
           R → Resource Allocation
           A → Accounting
           E → Error Detection
          A → Auxiliary Storage Management
```

👉 Exam me Functions of OS ka question aaye to sabse pehle diagram banao, phir ye 10 points explain karo. Isse 14 marks wale answer me 3–4 pages easily bhar jayenge. 🎯

Evolution of Operating System :-

Introduction

Shuruat me computers me koi Operating System nahi hota tha.

Users directly machine language me instructions dete the.

Jaise-jaise computer technology develop hui, Operating Systems bhi evolve hote gaye.

Definition

"Evolution of Operating System refers to the gradual development of operating systems from simple manual systems to modern multiuser and distributed systems."

Evolution Flow Diagram

⭐⭐⭐⭐⭐ Exam Diagram

```
No Operating System
        ↓
Serial Processing
        ↓
Batch Operating System
        ↓
Multiprogramming OS
        ↓
Time Sharing OS
        ↓
  Personal Computer OS
        ↓
Network OS
        ↓
Distributed OS
        ↓
Modern Operating Systems
```

---

1. No Operating System (1940–1955)

⭐⭐⭐⭐ Important

Introduction

Early computers me koi Operating System nahi tha.

Users directly hardware ko control karte the.

Features

✔ One User

✔ One Program

✔ Manual Operation

✔ Machine Language

Diagram

```
User
  ↓
Hardware
```

Advantages

✔ Simple

Disadvantages

❌ Very Slow

❌ Difficult to Use

❌ No Automation

---

2. Serial Processing System

Introduction

Programs ek ke baad ek manually execute kiye jate the.

Working

```
Job 1
 ↓
Job 2
```

```
          ↓
        Job 3
```

Problems

❌ CPU Idle Time

❌ Low Efficiency

---

3. Batch Operating System (1955–1965)

⭐⭐⭐⭐⭐ Frequently Asked

Introduction

Similar jobs ko batch me group karke execute kiya jata tha.

Diagram

```
Job 1
Job 2
Job 3
   ↓

 Batch

            ↓

        Execution
```

Features

✔ Automatic Job Processing

✔ Reduced Setup Time

Advantages

✔ High Throughput

✔ Better CPU Utilization

Disadvantages

❌ No User Interaction

❌ Long Waiting Time

---

4. Multiprogramming Operating System (1965–1975)

⭐⭐⭐⭐⭐ MOST IMPORTANT

Introduction

CPU idle na rahe isliye multiple programs memory me rakhe gaye.

Diagram

```
RAM

Program A

Program B

          Program C
```

Features

✔ Multiple Programs

✔ Better CPU Utilization

✔ Increased Throughput

Advantages

✔ Efficient Resource Utilization

Disadvantages

❌ Complex Memory Management

---

5. Time Sharing Operating System (1970–1980)

⭐⭐⭐⭐⭐ MOST IMPORTANT

Introduction

Multiple users ek hi system ko simultaneously use kar sakte hain.

CPU sab users ko small time slices deta hai.

Diagram

```
User1
```

```
User2

User3

   ↓

CPU Time Sharing
```

Features

✔ Interactive System

✔ Multiuser Support

✔ Fast Response Time

Example

```
UNIX
```

---

6. Personal Computer Operating System (1980–Present)

Introduction

Microprocessors ke development ke baad PCs popular hue.

Examples

```
MS-DOS

Windows
```

```
        Mac OS
```

Features

✔ GUI

✔ User Friendly

✔ Multitasking

---

7. Network Operating System

⭐⭐⭐⭐ Frequently Asked

Introduction

Network resources manage karta hai.

Diagram

```
PC1

PC2

PC3

  ↓

Network OS

            ↓

        Server
```

Examples

```
Windows Server

Linux Server
```

---

8. Distributed Operating System

⭐⭐⭐⭐⭐ Important

Introduction

Multiple computers milkar ek single system ki tarah kaam karte hain.

Diagram

```
Computer1

Computer2

Computer3

    ↓

        Distributed OS
```

Features

✔ Resource Sharing

✔ Load Balancing

✔ Reliability

---

9. Modern Operating Systems

⭐⭐⭐⭐⭐ Important

Today's OS provide:

✔ GUI

✔ Multitasking

✔ Multithreading

✔ Networking

✔ Security

✔ Cloud Support

Examples

```
Windows 11

Linux

Android

iOS

           macOS
```

Comparison Table of Evolution

Generation	OS Type	Main Feature
First	No OS	Manual Processing
Second	Batch OS	Job Batching

Third	Multiprogramming	Multiple Programs
Fourth	Time Sharing	Multiple Users
Fifth	PC OS	GUI
Sixth	Network OS	Network Support
Seventh	Distributed OS	Resource Sharing
Modern	Advanced OS	Multitasking + Security

Advantages of OS Evolution

1. Better Performance

2. Faster Processing

3. User Friendly Interface

4. Improved Security

5. Resource Sharing

Viva Questions

Q1. What is Evolution of OS?

Development of OS over time.

Q2. Which OS came first?

No Operating System.

Q3. What is Batch OS?

Processes jobs in batches.

Q4. What is Time Sharing OS?

CPU time shared among users.

Q5. Give examples of Modern OS.

Windows, Linux, Android.

Frequently Asked RGPV Questions

---

7 Marks

1. Explain evolution of Operating System.
2. Discuss various generations of OS.
3. Explain Batch and Time Sharing OS.

---

14 Marks

Q. Explain Evolution of Operating System with neat diagram.

Q. Discuss various stages in the development of Operating Systems.

Q. Explain the historical development of Operating Systems.

PYQ Trend Analysis

Topic	Frequency
Evolution of OS	⭐⭐⭐⭐⭐
Batch OS	⭐⭐⭐⭐⭐
Multiprogramming OS	⭐⭐⭐⭐⭐
Time Sharing OS	⭐⭐⭐⭐⭐
Distributed OS	⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain Evolution of Operating System.

🔥 Discuss various generations of Operating Systems.

🔥 Compare Batch OS and Time Sharing OS.

🔥 Explain Multiprogramming Operating System.

🔥 Explain Distributed Operating System.

One-Minute Revision

```
No OS
  ↓
Serial Processing
  ↓
Batch OS
  ↓
Multiprogramming OS
  ↓
Time Sharing OS
  ↓
PC OS
```

```
  ↓
Network OS
  ↓
Distributed OS
  ↓
Modern OS
```

Memory Trick

SBMTNDM

```
S → Serial Processing
B → Batch OS
M → Multiprogramming
T → Time Sharing
N → Network OS
D → Distributed OS
M → Modern OS
```

🎯 **Exam Tip:** Evolution ka answer likhte waqt sabse pehle flowchart banao, phir har generation ke features, advantages aur examples likho. Isse answer 3–4 pages ka ban jayega aur full marks milne ke chances badh jate hain.

Different Types of Operating System :-

> ⭐⭐⭐⭐⭐ MOST IMPORTANT TOPIC
>
> RGPV me **"Types of Operating System"** sabse jyada pucha jane wala Unit-1 topic hai.
>
> Direct 7 Marks aur 14 Marks ka question aata hai.
>
> Is answer ko achchhe se prepare karo.

Different Types of Operating System

Introduction

Operating System ko uske working method aur services ke basis par different categories me divide kiya jata hai.

Har Operating System ka apna purpose aur application area hota hai.

Definition

"Different Types of Operating Systems are classifications of OS based on the way they manage resources, users and processes."

Classification Diagram

⭐⭐⭐⭐⭐⭐ EXAM DIAGRAM

```
            Operating System

                    |

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

   |          |                  |           |              |                      |
|

Batch  Multi-          Multi-    Time         Real            Network
Distributed
             OS     Program    Tasking   Sharing    Time               OS
OS
                        ming OS         OS         OS           OS
```

---

1. Batch Operating System

⭐⭐⭐⭐⭐ Frequently Asked

Definition

Batch Operating System executes similar jobs in groups (batches) without user interaction.

Working

```
Job 1

Job 2

Job 3

   ↓

Batch

              ↓

       Execution
```

Example

```
Payroll System

Bank Statement Processing
```

Advantages

✔ High Throughput

✔ Automatic Job Execution

Disadvantages

❌ No User Interaction

❌ Long Waiting Time

---

2. Multiprogramming Operating System

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Definition

Multiprogramming OS keeps multiple programs in memory simultaneously to improve CPU utilization.

Diagram

```
RAM

Program A

Program B

            Program C
```

Working

Jab ek program I/O wait karta hai:

```
CPU

 ↓
```

```
      Another Program
```

execute hota hai.

Advantages

✔ Better CPU Utilization

✔ Increased Throughput

Disadvantages

❌ Complex Memory Management

---

3. Multitasking Operating System

⭐⭐⭐⭐⭐ Important

Definition

Multitasking OS allows multiple tasks to run apparently at the same time.

Example

```
Chrome

MS Word

         Music Player
```

Diagram

```
Task 1

Task 2

Task 3

   ↓

       CPU Switching
```

Advantages

✔ Better Productivity

✔ Efficient Resource Usage

Disadvantages

❌ More Memory Required

---

4. Time Sharing Operating System

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Definition

Time Sharing OS allocates CPU time in small portions (time slices) among multiple users.

Diagram

```
User 1

User 2
```

```
User 3

    ↓

CPU Time Sharing
```

Example

```
UNIX

Linux
```

Advantages

✔ Fast Response

✔ Multiuser Support

Disadvantages

❌ Security Issues

---

5. Real Time Operating System (RTOS)

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Definition

RTOS is an Operating System that provides response within a fixed time limit.

Types of RTOS

Hard Real Time OS

Deadline miss nahi ho sakti.

Example:

```
Missile Control System

Air Traffic Control
```

Soft Real Time OS

Small delay acceptable.

Example:

```
Video Streaming

Online Gaming
```

Advantages

✔ Fast Response

✔ High Reliability

Disadvantages

❌ Expensive

❌ Complex Design

---

6. Multiprocessing Operating System

⭐⭐⭐⭐ Frequently Asked

Definition

Multiprocessing OS uses multiple CPUs to execute tasks simultaneously.

Diagram

```
CPU1

CPU2

CPU3

   ↓

Operating System
```

Example

```
Windows Server

Linux Server
```

Advantages

✔ High Performance

✔ Parallel Processing

---

7. Distributed Operating System

⭐⭐⭐⭐⭐ Important

Definition

Distributed OS manages multiple computers and makes them appear as a single system.

Diagram

```
Computer1

Computer2

Computer3

      ↓

Distributed OS
```

Advantages

✔ Resource Sharing

✔ Load Balancing

Disadvantages

❌ Complex Management

---

8. Network Operating System

⭐⭐⭐⭐ Frequently Asked

Definition

Network OS manages network resources and communication between computers.

Diagram

```
PC1

PC2

PC3

  ↓

Server
```

Examples

```
Windows Server

Novell NetWare

Linux Server
```

Advantages

✔ Centralized Management

✔ Easy Resource Sharing

Disadvantages

❌ Server Dependency

Comparison Table

⭐⭐⭐⭐⭐ EXAM FAVOURITE

Type	Main Feature	Example
Batch OS	Batch Processing	Payroll System
Multiprogramming	Multiple Programs	Early UNIX
Multitasking	Multiple Tasks	Windows
Time Sharing	Multiuser	UNIX
RTOS	Fixed Response Time	Air Traffic Control
Multiprocessing	Multiple CPUs	Linux Server
Distributed	Multiple Computers	Amoeba
Network OS	Network Management	Windows Server

Advantages of Different OS Types

Efficient Resource Utilization

Faster Processing

Better User Experience

Improved Reliability

High Performance

Viva Questions

Q1. What is Batch OS?

Executes jobs in batches.

Q2. What is Multiprogramming?

Keeping multiple programs in memory.

Q3. What is RTOS?

Real Time Operating System.

Q4. What is Time Sharing OS?

CPU time shared among users.

Q5. What is Distributed OS?

OS managing multiple computers as one system.

Frequently Asked RGPV Questions

2 Marks

1. Define RTOS.
2. What is Batch OS?
3. What is Time Sharing OS?
4. What is Distributed OS?

---

5 Marks

1. Explain Multiprogramming OS.
2. Explain Multitasking OS.
3. Explain RTOS.

---

7 Marks

1. Explain different types of Operating Systems.
2. Compare Batch and Time Sharing OS.
3. Explain Distributed OS.

---

14 Marks

Q. Explain different types of Operating Systems with examples.

Q. Discuss Batch, Multiprogramming, Time Sharing and Real Time Operating Systems.

Q. Compare different Operating System types.

PYQ Trend Analysis

Topic	Frequency
Types of OS	⭐⭐⭐⭐⭐
RTOS	⭐⭐⭐⭐⭐
Time Sharing OS	⭐⭐⭐⭐⭐
Multiprogramming OS	⭐⭐⭐⭐⭐
Distributed OS	⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain different types of Operating Systems.

🔥 Explain Real Time Operating System with examples.

🔥 Compare Batch OS and Time Sharing OS.

🔥 Explain Multiprogramming Operating System.

🔥 Explain Distributed Operating System.

One-Minute Revision

```
Types of OS

1. Batch OS
2. Multiprogramming OS
3. Multitasking OS
4. Time Sharing OS
5. RTOS
6. Multiprocessing OS
7. Distributed OS
8. Network OS
```

Memory Trick

BMTTRMDN

```
B → Batch
M → Multiprogramming
T → Multitasking
T → Time Sharing
R → Real Time
M → Multiprocessing
D → Distributed
N → Network
```

🎯 **Exam Tip:** "Types of Operating System" answer me diagram + definition + features + advantages/disadvantages + examples likhoge to 14 marks ka answer easily 4 pages bhar dega aur

maximum marks milenge.

Desirable Characteristics and Features of an Operating System:-

Introduction:-

Operating System computer ka manager hota hai.

Ek achha Operating System wahi hota hai jo users ko better performance, security aur reliability provide kare.

Isi wajah se kuch important characteristics aur features kisi bhi Operating System me hone chahiye.

Definition

"Desirable Characteristics of an Operating System are the qualities that make an operating system efficient, reliable, secure and user-friendly."

Diagram

⭐⭐⭐⭐⭐ Exam Diagram

```
        Good Operating System

                |

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

```
Efficiency   Reliability   Security

Portability  Scalability   User Friendly

Flexibility  Robustness    Multitasking
```

Desirable Characteristics of Operating System:-

---

1. Efficiency

⭐⭐⭐⭐⭐ Most Important

Operating System available resources ka maximum utilization kare.

Resources:

```
CPU

Memory

Disk

I/O Devices
```

Example

CPU idle nahi rehna chahiye.

Advantages

✔ Better Performance

✔ Faster Execution

---

2. Reliability

⭐⭐⭐⭐⭐ Frequently Asked

Operating System stable aur dependable hona chahiye.

System crash kam hone chahiye.

Example

```
Windows

Linux Servers
```

Long time tak continuously run kar sakte hain.

Advantages

✔ Less Failure

✔ Stable System

---

3. Security

⭐⭐⭐⭐⭐⭐ Most Important

Unauthorized access ko rokna OS ka important feature hai.

Security Features

✔ Password Protection

✔ Authentication

✔ Access Control

✔ Data Encryption

Example

```
Login Password
```

---

4. User Friendly

Operating System easy to use hona chahiye.

Example

GUI (Graphical User Interface)

```
Windows

Android
```

Advantages

✔ Easy Learning

✔ Better User Experience

---

5. Portability

Operating System different hardware platforms par run kar sake.

Example

Linux

Different machines par install ho sakta hai.

Advantages

✔ Hardware Independence

---

6. Scalability

⭐⭐⭐⭐ Important

System ko future me easily upgrade kiya ja sake.

Example

```
Adding More RAM

Adding More CPU
```

OS support kare.

Advantages

✔ Future Expansion

---

7. Flexibility

Operating System changes aur updates ko support kare.

Example

Software Updates

Driver Updates

Advantages

✔ Adaptability

---

8. Robustness

⭐⭐⭐⭐ Frequently Asked

Errors ke baad bhi system properly work kare.

Example

Power Failure ke baad recovery.

Advantages

✔ Fault Tolerance

✔ Better Reliability

---

9. Multitasking Capability

⭐⭐⭐⭐⭐ Important

Ek time par multiple tasks execute kar sake.

Example

```
Chrome

MS Word

Music Player
```

Simultaneously run karna.

Advantages

✔ Better Productivity

---

10. Multiprogramming Support

Multiple programs memory me load ho sake.

Advantages

✔ Better CPU Utilization

---

11. Resource Sharing

Multiple users aur programs resources share kar saken.

Resources

```
Printer

Disk

Network
```

---

12. Fast Response Time

⭐⭐⭐⭐ Important

User request ka quick response mile.

Example

```
Mouse Click

↓

Immediate Action
```

Features of Operating System

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

---

1. Process Management

Processes create aur manage karta hai.

---

2. Memory Management

RAM allocate aur manage karta hai.

---

3. File Management

Files create, delete aur modify karta hai.

---

4. Device Management

I/O devices ko control karta hai.

---

5. Security and Protection

Data ko secure rakhta hai.

---

6. User Interface

CLI aur GUI provide karta hai.

---

7. Error Handling

Errors detect aur recover karta hai.

---

8. Networking

Network communication support karta hai.

Summary Table

⭐⭐⭐⭐⭐ Exam Favourite

Characteristic	**Purpose**
Efficiency	Better Resource Utilization

Reliability	Stable Working
Security	Data Protection
User Friendly	Easy Usage
Portability	Hardware Independence
Scalability	Future Growth
Flexibility	Easy Updates
Robustness	Error Recovery
Multitasking	Multiple Tasks
Fast Response	Quick Service

Advantages of Good Operating System

Efficient Resource Utilization

Better Security

High Reliability

Improved Performance

Better User Experience

Viva Questions

Q1. What is Reliability?

Ability to work without failure.

Q2. What is Portability?

Ability to run on different hardware.

Q3. What is Scalability?

Ability to grow with increasing resources.

Q4. Why Security is important?

To prevent unauthorized access.

Q5. What is Robustness?

Ability to recover from errors.

Frequently Asked RGPV Questions

---

7 Marks

1. Explain desirable characteristics of OS.
2. Discuss features of Operating System.
3. Explain User Friendly and Security characteristics.

---

14 Marks

Q. Explain desirable characteristics and features of Operating System.

Q. Discuss qualities of a good Operating System.

Q. Explain important characteristics required in modern Operating Systems.

PYQ Trend Analysis

Topic	Frequency
Characteristics of OS	⭐⭐⭐⭐⭐
Security	⭐⭐⭐⭐⭐
Reliability	⭐⭐⭐⭐
Scalability	⭐⭐⭐
User Friendly	⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain desirable characteristics of Operating System.

🔥 Explain features of Operating System.

🔥 Discuss qualities of a good Operating System.

🔥 Explain Security, Reliability and Efficiency.

🔥 Explain Scalability and Portability.

One-Minute Revision

```
Good OS Characteristics

1. Efficiency
2. Reliability
3. Security
4. User Friendly
5. Portability
```

```
6. Scalability
7. Flexibility
8. Robustness
9. Multitasking
10. Fast Response
```

Memory Trick

ERSUPSFRMF

```
E → Efficiency
R → Reliability
S → Security
U → User Friendly
P → Portability
S → Scalability
F → Flexibility
R → Robustness
M → Multitasking
F → Fast Response
```

🎯 **Exam Tip:** 14 marks ke answer me pehle definition likho, phir diagram banao, uske baad 10–12 characteristics heading ke saath explain karo aur last me features ki list likho. Isse answer 3–4 pages ka ho jayega aur full marks milne ke chances badh jayenge.

Operating System Services:-

Introduction

Operating System sirf user aur hardware ke beech interface hi nahi hota, balki users aur programs ko kai important services bhi provide karta hai.

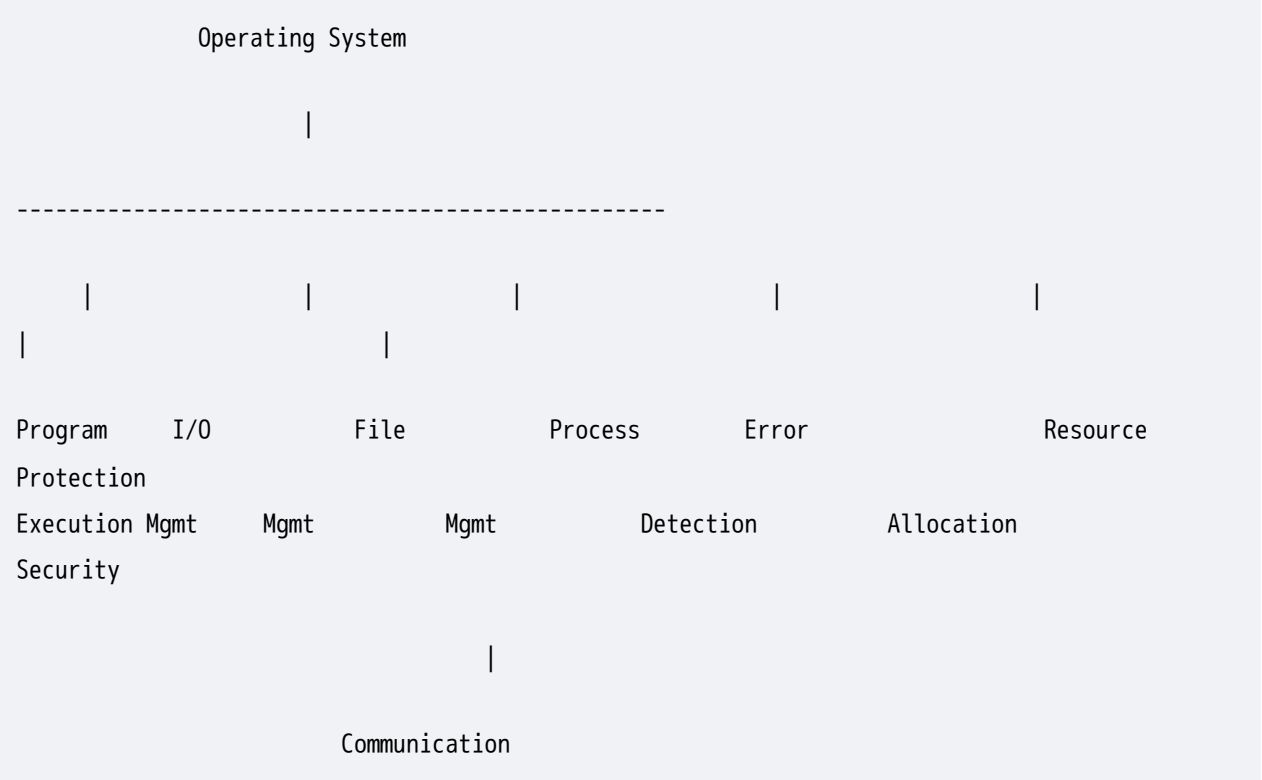
Ye services computer ko efficiently aur easily use karne me help karti hain.

Definition

"Operating System Services are the facilities and functions provided by the operating system to users and application programs for efficient execution and resource management."

Diagram of Operating System Services

⭐⭐⭐⭐⭐⭐ EXAM DIAGRAM



Need of Operating System Services

Without OS Services:

❌ Difficult Program Execution

❌ No File Management

❌ No Security

❌ No Resource Sharing

With OS Services:

✅ Easy User Interaction

✅ Efficient Resource Utilization

✅ Security

✅ Multitasking

Types of Operating System Services

Operating System mainly 9 important services provide karta hai.

---

1. Program Execution Service

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Operating System programs ko load, execute aur terminate karta hai.

Functions

✔ Load Program

✔ Execute Program

✔ Terminate Program

Example

```
Double Click Chrome

↓

OS Loads Chrome

↓

Chrome Starts Running
```

---

2. Input / Output Operations

⭐⭐⭐⭐⭐ Frequently Asked

Operating System I/O devices ko manage karta hai.

Devices

```
Keyboard

Mouse

Printer

Scanner
```

Example

```
Print Command

↓

OS

↓

Printer
```

Advantages

✔ Easy Device Handling

✔ Device Independence

---

3. File System Manipulation

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Operating System files aur directories manage karta hai.

Functions

✔ Create File

✔ Delete File

✔ Rename File

✔ Copy File

✔ Move File

Example

```
Create Folder

↓

Save File

↓
```

```
Delete File
```

---

4. Communication Service

⭐⭐⭐⭐⭐ Important

Processes aur users ke beech communication provide karta hai.

Types

Inter Process Communication (IPC)

Network Communication

Example

```
WhatsApp

↓

Internet

↓

Another User
```

---

5. Error Detection Service

⭐⭐⭐⭐ Frequently Asked

Operating System errors ko detect aur handle karta hai.

Errors

```
Memory Error

Disk Error

CPU Error

Network Error
```

Example

```
Disk Failure

↓

      Error Message
```

---

6. Resource Allocation Service

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Operating System resources allocate karta hai.

Resources

```
CPU

RAM

Disk

          Printer
```

Example

```
MS Word

Chrome

VLC

↓

CPU Time Allocation
```

---

7. Accounting Service

⭐⭐⭐⭐ Important

Operating System system resources ke usage ka record rakhta hai.

Example

```
CPU Usage

Memory Usage

Disk Usage
```

Advantages

✔ Performance Monitoring

✔ Billing Purpose

---

8. Protection Service

⭐⭐⭐⭐⭐ Important

System resources ko unauthorized access se protect karta hai.

Example

```
User Login

↓

Password Check
```

Functions

✔ Authentication

✔ Authorization

✔ Access Control

---

9. Security Service

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Data aur resources ko secure rakhta hai.

Security Features

✔ Password Protection

✔ Encryption

✔ Firewall

✔ Antivirus Support

Example

```
Windows Login

↓

Password Verification
```

User Services vs System Services

⭐⭐⭐⭐⭐ Exam Favourite Table

User Services	**System Services**
Program Execution	Resource Allocation
I/O Operations	Accounting
File Manipulation	Protection
Communication	Security
Error Handling	Performance Monitoring

Summary Table

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Service	**Purpose**
Program Execution	Run Programs
I/O Operations	Device Access
File Management	Manage Files

Communication	Data Exchange
Error Detection	Detect Errors
Resource Allocation	Allocate Resources
Accounting	Track Usage
Protection	Access Control
Security	Data Safety

Advantages of Operating System Services

1. Easy Program Execution

2. Better Resource Management

3. Improved Security

4. Better User Experience

5. Efficient System Performance

Viva Questions

Q1. What are Operating System Services?

Facilities provided by OS to users and programs.

Q2. What is Program Execution Service?

Service used to execute programs.

Q3. What is File Manipulation?

Managing files and directories.

Q4. What is Resource Allocation?

Allocating system resources.

Q5. What is Protection Service?

Preventing unauthorized access.

Frequently Asked RGPV Questions

---

7 Marks

1. Explain Operating System Services.
2. Explain Resource Allocation and Protection.
3. Explain Security and Accounting Services.

---

14 Marks

Q. Explain various Operating System Services with neat diagram.

Q. Discuss the services provided by an Operating System.

Q. Explain user-oriented and system-oriented services of an Operating System.

PYQ Trend Analysis

Topic	Frequency
OS Services	⭐⭐⭐⭐⭐
Program Execution	⭐⭐⭐⭐⭐
Resource Allocation	⭐⭐⭐⭐⭐
Security	⭐⭐⭐⭐
File Management	⭐⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain Operating System Services with diagram.

🔥 Discuss Program Execution and Resource Allocation Services.

🔥 Explain File Management and Communication Services.

🔥 Explain Protection and Security Services.

🔥 Differentiate User Services and System Services.

One-Minute Revision

```
Operating System Services

1. Program Execution
2. I/O Operations
3. File Management
4. Communication
5. Error Detection
6. Resource Allocation
7. Accounting
8. Protection
9. Security
```

Memory Trick

PIFCERAPS

```
P → Program Execution

I → I/O Operations

F → File Management

C → Communication

E → Error Detection

R → Resource Allocation

A → Accounting

P → Protection

S → Security
```

🎯 **Exam Tip:** "Operating System Services" ka answer likhte waqt sabse pehle diagram banao, phir 9 services ko heading-wise explain karo. Diagram + table + examples add karoge to answer easily 3–4 pages ka ho jayega aur full marks milne ke chances bahut badh jayenge.

Types of Operating System Services:-

> ⭐⭐⭐⭐⭐ MOST IMPORTANT TOPIC
>
> RGPV me **"Types of Operating System Services"** direct 7 aur 14 marks me pucha jata hai.
>
> Exam me sabse important classification hai:

> **User-Oriented Services** aur **System-Oriented Services**

Introduction

Operating System users aur programs ko different services provide karta hai.

In services ka purpose hai:

✔ Easy Computer Usage

✔ Resource Management

✔ Better Performance

✔ Security

Definition

"Operating System Services are the facilities provided by the OS to users and programs for efficient execution and management of computer resources."

Classification of OS Services

⭐⭐⭐⭐⭐⭐ EXAM DIAGRAM

```
Operating System Services

                |

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

  |                                 |
```

```
          User Oriented              System Oriented
             Services                    Services
```

---

1. User-Oriented Services

User ko directly help karne wali services.

Diagram

```
User

  ↓

Operating System

  ↓

Services
```

Types of User-Oriented Services

1. Program Execution

⭐⭐⭐⭐⭐ Most Important

OS program ko load aur execute karta hai.

Example

```
Chrome Open

↓

OS Execute
```

---

2. I/O Operations

Input aur Output devices ko access karne ki facility.

Example

```
Keyboard

Mouse

Printer
```

---

3. File System Manipulation

Files aur folders manage karna.

Functions

✔ Create File

✔ Delete File

✔ Rename File

✔ Copy File

---

4. Communication

Processes aur users ke beech communication.

Example

```
Email

WhatsApp

Network Communication
```

---

5. Error Detection

Errors detect aur report karna.

Example

```
Disk Error

Memory Error
```

User-Oriented Services Table

Service	Purpose
Program Execution	Run Programs
I/O Operations	Device Access
File Manipulation	Manage Files
Communication	Data Exchange
Error Detection	Detect Errors

---

2. System-Oriented Services

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

System ke efficient operation ke liye services.

Types of System-Oriented Services

---

1. Resource Allocation

CPU, Memory, Printer etc. allocate karta hai.

Example

```
Chrome

MS Word

VLC

 ↓

CPU Time Allocation
```

---

2. Accounting

Resource usage track karta hai.

Example

```
CPU Usage

RAM Usage

Disk Usage
```

---

3. Protection

Unauthorized access ko rokta hai.

Example

```
User Login

 ↓

Authentication
```

---

4. Security

⭐⭐⭐⭐⭐ Frequently Asked

System aur data ko secure rakhta hai.

Security Features

✔ Password

✔ Encryption

✔ Firewall

System-Oriented Services Table

Service	Purpose
Resource Allocation	Resource Distribution
Accounting	Usage Tracking
Protection	Access Control
Security	Data Protection

Complete Classification Diagram

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

```
Operating System Services

                |

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

User Services                                 System Services
```

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

Program Execution                          Resource Allocation

I/O Operations                                   Accounting

           File Management                                  Protection

          Communication                                     Security

           Error Detection
```

User Services vs System Services

⭐⭐⭐⭐⭐⭐ EXAM FAVOURITE TABLE

User-Oriented Services	**System-Oriented Services**
Directly help user	Help system operation
Program Execution	Resource Allocation
File Management	Accounting
Communication	Protection
I/O Operations	Security
Error Detection	System Monitoring

Advantages of OS Services

Easy Computer Usage

Better Performance

Resource Sharing

Improved Security

Efficient Management

Viva Questions

Q1. What are OS Services?

Facilities provided by OS.

Q2. How many major types of services are there?

Two.

```
1. User-Oriented

2. System-Oriented
```

Q3. What is Program Execution Service?

Service for running programs.

Q4. What is Resource Allocation?

Allocating CPU, Memory etc.

Q5. What is Protection Service?

Preventing unauthorized access.

Frequently Asked RGPV Questions

---

7 Marks

1. Explain Types of OS Services.
2. Differentiate User and System Services.
3. Explain Security and Protection Services.

---

14 Marks

Q. Explain various types of Operating System Services.

Q. Classify Operating System Services with suitable examples.

Q. Differentiate User-Oriented and System-Oriented Services.

PYQ Trend Analysis

Topic	Frequency
Types of Services	⭐⭐⭐⭐⭐
User Services	⭐⭐⭐⭐⭐
System Services	⭐⭐⭐⭐⭐
Resource Allocation	⭐⭐⭐⭐
Security	⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain Types of Operating System Services.

🔥 Differentiate User-Oriented and System-Oriented Services.

🔥 Explain Program Execution and Resource Allocation Services.

🔥 Explain Security and Protection Services.

🔥 Classify Operating System Services with examples.

One-Minute Revision

```
Types of OS Services

1. User-Oriented Services
   - Program Execution
   - I/O Operations
   - File Management
   - Communication
   - Error Detection

2. System-Oriented Services
   - Resource Allocation
   - Accounting
   - Protection
   - Security
```

Memory Trick

PIFCE – RAPS

```
P → Program Execution
I → I/O Operations
F → File Management
C → Communication
E → Error Detection
R → Resource Allocation
            A → Accounting
```

```
P → Protection
S → Security
```

🎯 **Exam Tip:** "Types of Services" ke answer me pehle classification diagram banao, phir User-Oriented aur System-Oriented Services ko alag-alag headings me explain karo. Last me comparison table zarur banao. Isse 14 marks ka answer complete ho jata hai.

Different Ways of Providing Operating System Services – Utility Programs and System Calls :-

> ⭐⭐⭐⭐⭐ MOST IMPORTANT TOPIC
>
> RGPV me **"Different Ways of Providing OS Services – Utility Programs and System Calls"** direct 7 marks aur 14 marks me pucha jata hai.
>
> Ye Unit-1 ka exam favourite topic hai.

Introduction

Operating System users ko services provide karta hai.

Question:

```
OS Services User Tak Kaise Pahuchti Hain?
```

Answer:

OS mainly do tariko se services provide karta hai:

```
1. Utility Programs
```

```
2. System Calls
```

Diagram

⭐⭐⭐⭐⭐ EXAM DIAGRAM

```
Operating System Services

          |

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

|                      |

Utility Programs   System Calls
```

Utility Programs

⭐⭐⭐⭐⭐ MOST IMPORTANT

Introduction

Utility Programs special software hote hain jo Operating System ki functionality ko improve karte hain aur users ko convenient services provide karte hain.

Definition

"Utility Programs are system software that perform specific maintenance and management tasks for efficient operation of the computer system."

Working

```
User

  ↓

Utility Program

  ↓

Operating System

              ↓

          Hardware
```

Examples of Utility Programs

1. Antivirus Software

Virus detect aur remove karta hai.

Example:

```
Quick Heal

Windows Defender
```

---

2. Disk Cleanup

Unwanted files remove karta hai.

---

3. Backup Utility

Data backup create karta hai.

---

4. Disk Defragmenter

Disk performance improve karta hai.

---

5. File Compression Utility

Files ka size reduce karta hai.

Example:

```
WinZip

WinRAR
```

---

6. File Management Utility

Files ko organize karta hai.

Diagram of Utility Programs

```
Utility Programs

       |

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

Antivirus

Backup

Disk Cleanup

           Compression

           Defragmentation
```

Advantages of Utility Programs

Easy System Maintenance

Better Performance

Improved Security

Efficient Resource Usage

User Friendly

Disadvantages

Additional Memory Required

Some Utilities are Paid

System Calls

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

Introduction

User programs directly hardware access nahi kar sakte.

Operating System ke functions access karne ke liye System Calls use kiye jate hain.

Definition

"A System Call is a programming interface through which a user program requests services from the Operating System kernel."

Working of System Call

⭐⭐⭐⭐⭐⭐ EXAM DIAGRAM

```
Application Program

          |

     System Call

          |

Operating System Kernel

                    |

                Hardware
```

Example

Suppose file open karni hai:

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

Ye ek System Call hai.

Why System Calls are Needed?

File Access

Process Creation

Memory Management

Device Access

Communication

Types of System Calls

⭐⭐⭐⭐⭐⭐ MOST IMPORTANT

---

1. Process Control System Calls

Processes ko manage karte hain.

Examples

```
fork()

exit()

          wait()
```

Functions

✔ Create Process

✔ Terminate Process

✔ Execute Process

---

2. File Management System Calls

Files manage karte hain.

Examples

```
open()

close()

read()

          write()
```

Functions

✔ Create File

✔ Delete File

✔ Read File

✔ Write File

---

3. Device Management System Calls

Devices ko access karte hain.

Examples

```
read()

write()

           ioctl()
```

Functions

✔ Device Request

✔ Device Release

---

4. Information Maintenance Calls

System information provide karte hain.

Examples

```
getpid()

time()
```

Functions

✔ Process Information

✔ System Information

---

5. Communication System Calls

Processes ke beech communication.

Examples

```
pipe()

message()

            socket()
```

Types Diagram

```
System Calls

      |

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

Process Control

File Management

Device Management

          Information Maintenance

         Communication
```

Utility Programs vs System Calls

⭐⭐⭐⭐⭐⭐ EXAM FAVOURITE TABLE

Utility Programs	**System Calls**
User Level Programs	Kernel Interface
Easy to Use	Used by Programmers
Provide Maintenance Services	Request OS Services
Example: Antivirus	Example: open(), fork()
Indirect OS Access	Direct OS Access

Advantages of System Calls

Direct Access to OS Services

Efficient Resource Management

Better Security

Controlled Hardware Access

Real Life Example

Suppose bank me kaam karna hai.

Utility Program

```
Customer Help Desk
```

Direct help.

System Call

```
Official Application Form
```

Jiske through service request ki jati hai.

Viva Questions

Q1. What is a Utility Program?

Software used for maintenance tasks.

Q2. What is a System Call?

Interface between program and OS.

Q3. Give examples of Utility Programs.

Antivirus, Backup Utility.

Q4. Give examples of System Calls.

open(), read(), write().

Q5. Why are System Calls required?

To access OS services.

Frequently Asked RGPV Questions

7 Marks

1. Explain different ways of providing OS services.
2. Explain Utility Programs and their functions.
3. Explain types of System Calls.

---

14 Marks

Q. Explain different ways of providing Operating System Services.

Q. Explain Utility Programs and System Calls with suitable examples.

Q. Discuss various types of System Calls with neat diagram.

PYQ Trend Analysis

Topic	Frequency

System Calls	⭐⭐⭐⭐⭐
Utility Programs	⭐⭐⭐⭐
Types of System Calls	⭐⭐⭐⭐⭐
Comparison Table	⭐⭐⭐⭐⭐

Expected 2026 Questions

🔥 Explain Utility Programs with examples.

🔥 Explain System Calls and their types.

🔥 Differentiate Utility Programs and System Calls.

🔥 Explain Process Control and File Management System Calls.

🔥 Explain different ways of providing Operating System Services.

One-Minute Revision

```
OS Services

       |

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

1. Utility Programs

   Antivirus
   Backup
   Compression
   Disk Cleanup

2. System Calls

          Process Control
```

```
 File Management
Device Management
Information Maintenance
Communication
```

Memory Trick

Utility Programs = ABCD

```
A → Antivirus
B → Backup
C → Compression
          D → Disk Cleanup
```

System Calls = PFDIC

```
P → Process Control
F → File Management
D → Device Management
            I → Information Maintenance
         C → Communication
```

🎯 **Exam Tip:** Is question me diagram + definitions + types of system calls + Utility Programs vs System Calls table zarur likho. Ye answer easily 4 pages bhar deta hai aur full marks lane wala topic hai. 🚀📚