

**SPPU New Syllabus**

***A Book Of***

# **Operating System Concepts**

**For M.C.A. (Management) : Semester - I**

**[Course Code IT-14 : Credit - 03]**

**CBCS Pattern**

**As Per New Syllabus, Effective from June 2020**

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## Preface ...

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I take this opportunity to present this book entitled as “**Operating System Concepts**” to the students of First Semester - MCA (Management). The object of this book is to present the subject matter in a most concise and simple manner. The book is written strictly according to the New Syllabus (CBSC Pattern).

The book has its own unique features. It brings out the subject in a very simple and lucid manner for easy and comprehensive understanding of the basic concepts, its intricacies, procedures and practices. This book will help the readers to have a broader view on Operating System Concepts. The language used in this book is easy and will help students to improve their vocabulary of Technical terms and understand the matter in a better and happier way.

I sincerely thank Shri. Dineshbhai Furia and Shri. Jignesh Furia of Nirali Prakashan, for the confidence reposed in me and giving me this opportunity to reach out to the students of management studies.

I have given my best inputs for this book. Any suggestions towards the improvement of this book and sincere comments are most welcome on [niralipune@pragationline.com](mailto:niralipune@pragationline.com).

**Author**





# Syllabus ...

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## 1. Overview

[Weightage 15, Session 7]

- 1.1 Overview of Operating Systems
- 1.2 Functionalities and Characteristics of OS
- 1.3 Hardware Concepts related to OS
- 1.4 CPU States
- 1.5 I/O Channels
- 1.6 Memory Management
  - 1.6.1 Memory Management Techniques
  - 1.6.2 Contiguous and Non-Contiguous Allocation
  - 1.6.3 Logical and Physical Memory Conversion of Logical to Physical Address
- 1.7 Paging
  - 1.7.1 Demand Paging
  - 1.7.2 Page Replacement Concept
- 1.8 Segmentation - Segment with Paging
- 1.9 Virtual Memory Concept
- 1.10 Thrashing

**Extra Reading:** Type of OS, Batch OS, Time Sharing OS, Network OS, Multiprogramming OS, Multiprocessing OS, Evolution of Operating System, Computer System Organization Operating System Structure and Operations - System Calls, System Programs, OS Generation and System Boot.

## 2. Process Management and Synchronization

[Weightage 17, Session 8]

- 2.1 PCB
- 2.2 Job and Processor Scheduling
- 2.3 Scheduling Concept
- 2.4 Process Hierarchies
- 2.5 Problems of Concurrent Processes
- 2.6 Critical Sections
- 2.7 Mutual Exclusion
- 2.8 Synchronization
- 2.9 Deadlock
- 2.10 Device and File Management
  - 2.10.1 Overview
  - 2.10.2 Techniques
  - 2.10.3 File Systems

**Extra Reading:** Threads – Overview, Multithreading Models, Threading Issues, Process Synchronization – The Critical-section Problem, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Critical Regions, Monitors; Deadlock – System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock., Banker's Algorithms.

### **3. Multiprocessor and Multicore Operating Systems [Weightage 17, Session 8]**

- 3.1 Introduction
  - 3.1.1 Advantages and Disadvantages
  - 3.1.2 Multicore System Vs. Multiprocessor System
- 3.2 Types of Multiprocessors
  - 3.2.1 Symmetric Multiprocessors
  - 3.2.2 Asymmetric Multiprocessors
- 3.3 Basic Multicore Concepts: Memory Sharing Styles
  - 3.3.1 Uniform Memory Access (UMA)
  - 3.3.2 Non-Uniform Memory Access (NUMA)
  - 3.3.3 No Remote Memory Access (NORMA)
- 3.4 Cache Coherence, Inter-Process (and Intercore) Communication
  - 3.4.1 Shared Memory
  - 3.4.2 Message Passing
- 3.5 Mobile Operating Systems
  - 3.5.1 Concept Need and Features
  - 3.5.2 Types of Mobile OS
  - 3.5.3 Overview of Android OS
  - 3.5.4 Applications of Mobile OS
- 3.6 Distributed Operating Systems
  - 3.6.1 Concept Need and Features
  - 3.6.2 Examples of Distributed OS with brief introduction
  - 3.6.3 Applications of Distributed OS

**Extra Reading:** Virtual Machine, Cache Memory and Caching Concept, Multi-Processor and Distributed Operating System – Introduction – Architecture – Organization, Resource sharing – Load Balancing – Availability and Fault Tolerance – Design and Development Challenges – Inter-process Communication.

### **4. Real Time OS**

**[Weightage 10, Session 4]**

- 4.1 Introduction and use of RTOS
  - 4.1.2 Components of RTOS
  - 4.1.3 Types of RTOS
  - 4.1.4 Features of RTOS
  - 4.1.5 Factors for Selecting in RTOS
  - 4.1.6 Applications of RTOS
  - 4.1.7 Disadvantages of RTOS

## 4.2 Embedded OS

### 4.2.1 Concept Need and Features of Embedded OS

### 4.2.2 Examples of Embedded OS with brief Introduction

### 4.2.3 Applications of Embedded OS

**Extra Reading:** Real Time and Embedded Operating Systems – Introduction, Hardware Elements, – Structure Interrupt Driven, Interrupt Driven, Nanokernel, Nanokernel, Microkernel and Microkernel and Monolithic kernel based models. Monolithic kernel based models. – Scheduling – Periodic, Periodic, Aperiodic and Aperiodic and Sporadic Tasks, Sporadic Tasks, – Introduction to Energy Aware CPU Scheduling.

## 5. Windows OS and Windows Server Architecture [Weightage 24, Session 12]

### 5.1 Windows OS

#### 5.1.1 Introduction

#### 5.1.2 Windows OS Installation

#### 5.1.3 Process Management

#### 5.1.4 Control Panel Overview

#### 5.1.5 Users, Security and Privacy Settings

#### 5.1.6 Identify Accessibility Settings

#### 5.1.7 Service Management

#### 5.1.8 Syncing Devices and File Sharing

#### 5.1.9 Windows Utilities (Accessories, Disk Management, Resource Monitor, Backup and Recovery), Basic Troubleshooting (Networking, Security, Device Driver).

### 5.2 Introduction to Ubuntu

#### 5.2.1 Introduction

#### 5.2.2 Overview of Kernel

#### 5.2.3 Installation of Ubuntu

#### 5.2.4 File System

#### 5.2.5 Basic Commands of Linux

#### 5.2.6 Managing Processes in Linux

#### 5.2.7 Installing and Deleting Software Packages

#### 5.2.8 User Management

#### 5.2.9 File and Device Management

#### 5.2.10 Backup and Recovery

#### 5.2.11 Introduction to Graphical Environment (GNOME), Ubuntu Utilities (VirtualBox, Evolution, Gimp, Bleach Bit, Unity Tweak Tool etc.), SAMBA Overview

**Extra Reading:** Deploying and Managing Windows Server 2012 and 2016, Introduction to Active Directory Domain Services, Managing Active Directory Domain Services Objects, Automating Active Directory Domain Services Administration, Implementing IPv4, Implementing DHCP, Implementing DNS, Implementing Local Storage, Implementing File and Print Services, Implementing Group Policy.

## 6. Linux Shell Scripting

[Weightage 16, Session 6]

- 6.1 Introduction
- 6.2 Variables
- 6.3 Flow Controls
- 6.4 Loops
- 6.5 Functions
- 6.6 Lists
- 6.7 Manipulating Strings
- 6.8 Reading and Writing Files
- 6.9 Positional Parameters
- 6.10 Case Statement
- 6.11 Real Time Scripts for different System Administration Activities

**Extra Reading:** Shell Script Programming Concepts, Sequential Flow and Components of Shell Scripting, Decision Structures, Decision - Structure Theory, Statements and Operators, Looping Structures, Loop Theory and Statements, Functions and Arrays, Functions Parts/Libraries and Arrays, Advanced Shell Programming, File Access, Sorts and Techniques, Advanced Tech and Tools, Awk and Sed, Script Design and Management Issues.





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