22CA1T4: OPERATING SYSTEMS

Course Name	Operating Systems		L	T	P	C	CIA	SEE	TM
Course Code	22CA1T4		4	0	0	4	30	70	100
Year of Introduction: 1991	Year of Offering: 2022	Year of Revision: 2022			Percentage of Revision: 20				
L-Lecture, T-Tutorial, **P**-Practical, **C**-Credits, **CIA**-Internal Marks, **SEE**-External Marks, **TM**-Total Marks									

Course Description and Purpose:
Operating Systems is a course that illustrates *Operating System Concepts*, *Operating System Structure*, *Processes Concepts*, *Threads*, *Process Synchronization*, *Scheduling*, *Deadlocks*, *Main Memory*, *Virtual Memory*, *Mass Storage Structure*, *File System Implementation*,. *Distributed Operating Systems* and *Mobile & Android Operating Systems*

Course Objectives:
This course will help enable the students to understand and learn *Operating System Concepts*, *Operating Structure*, *Process Concepts*, *Thread Concept*, *Process Synchronization*, *Scheduling*, *Deadlocks*, *Main Memory*, *Virtual Memory and Mass Storage Structure*, *File System Implementation*, *Distributed Operating Systems* and *Mobile & Android Operating Systems*.

Specific objectives include:
- ✓ To understand the *Basic Concepts of Operating System*, *Operating System Structure and Process Concept*.
- ✓ To apply concepts of *Threads*, *Process Synchronization & CUP Scheduling*.
- ✓ To understand *Deadlock*, *Main Memory & Virtual Memory*.
- ✓ To explain *Mass Storage Structure*, *File System Interface & File System Implementation*.
- ✓ To understand the concepts of *Distributed Operating Systems* and *Mobile & Android Operating Systems*.

Course Learning Outcomes:
Upon successful completion of the course, the student will be able to:
CO1: Understand the Basic Concepts of Operating System, Operating System Structure and Process Concept.
CO2: Applying concepts of Threads, Process Synchronization & CUP Scheduling.
CO3: Understand Deadlock, Main Memory & Virtual Memory.
CO4: Explain Mass Storage Structure, File System Interface & File System Implementation.
CO5: Understand the concepts of Distributed Operating Systems and Mobile & Android Operating Systems.

UNIT I (12 Hours)

Introduction to Operating System Concepts: Functions of Operating System, Operating System Structure, Operating System Operations, Kernel Data Structure, Computing Environment.
Operating System Structures: Operating System Services, System Calls, Types of System Calls.
Processes: Process Concept, Process Scheduling, Operations on Processes, Inter Process Communication, Communication in Client-Server Systems.

UNIT II (12 Hours)

Threads: Overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit Threading, Threading Issues.
Process Synchronization: Background,The Critical Section Proble, Peterson's Solution,Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors.
CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Multiple Processor Scheduling.

UNIT III (12 Hours)

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.
Main Memory: Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table, Intel 32 and 64-bit Architectures.
Virtual Memory: Background, Demand Paging, Copy-on-Write, Page Replacement, Allocation ofFrames, Thrashing.

UNIT IV (12 Hours)

File System Interface: File Concept, Access Methods, Directory and Disk Structure, File SystemMounting, Protection.

File System Implementation: File System Structure, File System Implementation, Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery.

UNIT V (12 Hours)

Distributed Operating Systems: Types of Network based Operating Systems, Network Structure, Network Topology, Communication Structure, Communication Protocols, Robustness, Design Issues.

Mobile & Android Operating Systems: A review of Mobile Operating Systems, Features of Android Operating Systems.

Reference Text Books:

1. Abraham Silberschatz,& PeterBaer Galvin, Greg, Operating System Concept, Ninth Edition, Wiley, 2015
2. William Stallings, Operating Systems-Internals and Design Principles, Fifth Edition, Pearson Education, 2007
3. Achyut S Godbole, Operating Systems, Second Edition, TMH, 2007
4. Flynn/McHoes, Operating Systems, Cengage Learning, 2008.
5. Deitel & Deitel, Operating System, Third Edition, Pearson Education, 2008

PARVATHANENI BRAHMAYYA SIDDHARTHA COLLEGE OF ARTS & SCIENCE

(An Autonomous College in the jurisdiction of Krishna University)

M.Sc.(Computer Science), First Semester

Course Name: Operating Systems

Course Code: 22CA1T4

(w.e.f admitted batch 2022-22)

Time: 3 Hours **Max Marks: 70**

SECTION-A

Answer ALL questions. All Questions Carry Equal Marks. (5×4 = 20 Marks)

1.(a) Explain the structure of Operating System. (CO1,L2)

(or)

(b) Explain *Inter Process Communication*. (CO1,L2)

2. (a) List various *Multithreading Model*. (CO2,L1)

(or)

(b) What is *Semaphore*. (CO2,L1)

3. (a) Test for *Demand Paging.* (CO3,L4)

(or)

(b) Analyze Paging. (CO3,L4)

4. (a) Demonstrate the *File Concept* (CO4,L2)

(or)

(b) Explain various *File Operations*. (CO4,L2)

5. (a) Construct a *Network Topology.* (CO5,L3)

(or)

(b) Identify the design issues in *Distributed OS*. (CO5,L3)

SECTION-B

Answer ALL questions. All Questions Carry Equal Marks. (5×10 = 50 Marks)

6. (a) Explain *Operating System Services*. (CO1,L2)

(or)

(b) Explain various types *System Calls*. (CO1,L2)

7. (a) Illustrate the *Dining Philosophers Problem* of Process Synchronization. (CO2,L2)

(or)

(b) Demonstrate (CO2,L2)

(i) First-Come, First-Served Scheduling with the following data

Process	Burst Time
P1	24
P2	3
P3	3

(ii) Shortest-Job-First Scheduling with following data

Process	Burst Time
P1	6
P2	8
P3	7
P4	3

8. (a) Apply the necessary conditions for preventing *Deadlock Situation.* (CO3,L3)

(or)

(b) Utilize the reference string 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 for a memory with three frames implement *Optimal Page Replacement* and *LRU PageReplacement*. (CO3,L3)

9. (a) Compare *Single-Level Directory*, *Two Level Directory*, and *Tree-Structured Directories*. (CO4,L4)

(or)

(b) Categorize various *Allocation Methods* of *File System Implementation*. (CO4,L4)

10.(a) Explain various types of *Network based Operating Systems*. (CO5,L5)

(or)

(b) Explain features of *Mobile Operating Systems*. (CO5,L5)