ADVANCED OPERATING SYSTEMS

I Semester: ECE(ES)								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
BESC04	**ELECTIVE**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	1	0	4	30	70	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes:45**		

I. COURSE OVERVIEW:

This course is intended to provide fundamentals of distributed operating system, algorithms for dead lock detection , memory sharing algorithms , fault tolerance procedures ,data security and protection mechanisms .It also introduces study of other operating systems multiprocessor operating systems and database Operating systems. The study of this gives understanding of any type of operating system in real world.

II. COURSE OBJECTIVES:

The students will try to learn:

I. Basic concepts on distributed operating system that includes architecture, mutual exclusion algorithms, deadlock detection algorithms and agreement protocols.
II. The concepts of distributed resource management components, the algorithms for implementing of distributed shared memory, recovery, data protection and security.
III. The fundamentals of multiprocessor operating systems and database operating systems for real time and mobile operating systems applications.

III. COURSEOUTCOMES:

After successful completion of the course, students should be able to:

CO1	Recall the basics of operating system for better understanding of distributed operating system architecture.	Remember
CO2	Demonstrate the principles, importance and design issues of distributed operating system.	Understand
CO 3	Apply suitable algorithm to detect and control dead lock in distributed systems	Apply
CO 4	Explain the security issues associated with distributed systems and techniques for increasing system security.	Understand
CO 5	Model the Distributed File System and Distributed Shared Memory based on requirement.	Understand
CO 6	Identify the agreement problems and algorithms to resolve it in order to reduce errors in distributed system.	Apply

IV. SYLLABUS:

MODULE – I: ARCHITECTURES OF DISTRIBUTED SYSTEMS (09)

System Architecture types, issues in distributed operating systems, communication networks, communication primitives. Theoretical Foundations, inherent limitations of a distributed system, lamp ports logical clocks, vector clocks, casual ordering of messages, global state, cuts of a distributed computation, termination detection. Distributed Mutual Exclusion, introduction, the classification of mutual exclusion and associated algorithms, a comparative performance analysis.

MODULE – II: DISTRIBUTED DEADLOCK DETECTION (9)

Introduction - deadlock handling strategies in distributed systems – issues in deadlock detection and resolution – control organizations for distributed deadlock detection – centralized and distributed deadlock detection algorithms –hierarchical deadlock detection algorithms. Agreement protocols – introduction-the system model,

a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture – mechanism for building distributed file systems – design issues – log structured file systems.

MODULE – III: DISTRIBUTED SHARED MEMORY (9)

Architecture– algorithms for implementing DSM – memory coherence and protocols – design issues. Distributed Scheduling – introduction – issues in load distributing – components of a load distributing algorithm – stability – load distributing algorithm – performance comparison – selecting a suitable load sharing algorithm – requirements for load distributing -task migration and associated issues. Failure Recovery and Fault tolerance:

Introduction– basic concepts – classification of failures – backward and forward error recovery, backward error recovery- recovery in concurrent systems – consistent set of check points – synchronous and asynchronous check pointing and recovery – check pointing for distributed database systems- recovery in replicated distributed databases

MODULE – IV: SOFTWARE (09)

Preliminaries, the access matrix model and its implementations.-safety in matrix model- advanced models of protection. Data security – cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard- public key cryptography – multiple encryption – authentication in distributed systems.

MODULE – V: MULTIPROCESSOR OPERATING SYSTEMS AND DATABASE OPERATING SYSTEMS (9)

Basic multiprocessor system architectures – inter connection networks for multiprocessor systems – caching – hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling.. Introduction- requirements of a database operating system Concurrency control : theoretical aspects – introduction, database systems – a concurrency control model of database systems- the problem of concurrency control – serializability theory- distributed database systems, concurrency control algorithms – introduction, basic synchronization primitives, lock based algorithms-timestamp based algorithms, optimistic algorithms – concurrency control algorithms, data replication.

V. TEXT BOOKS:

1. "Advanced Concepts In Operating Systems", McGraw-Hill computer science series
2. Mukesh Singhal, Niranjan G. Shivaratri , "Advanced Operating Systems - Distributed, Multiprocessor and Database Operating Systems", 1994.

VI. REFERENCE BOOKS:

1. Sape Mullender, "Distributed Systems", Addison-Wesley publications.
2. Maekawa, Oldehoeft, "OS: Advanced Concepts", Addison-Wesley publications.

VII. WEB REFERENCES:

1. https://nptel.ac.in/courses/106/105/106105214/#2.
2. https://nptel.ac.in/courses/106/106/106106144/

VIII. E-TEXT BOOKS:

1. https://www.scribd.com/doc/233633895/Intro-to-Embedded-Systems-by-Shibu-Kv
2. http://www.ee.eng.cmu.ac.th/~demo/think/_DXJSq9r3TvL.pdf