Operating System (Theory)

Course Code	18CS42/18IS42	**Credits**	04
Course type	PC	**CIE Marks**	50 marks
Hours/week: L-T-P	4 – 0 – 0	**SEE Marks**	50 marks
Total Hours:	Lecture = 47 Hrs; Tutorial = 00 Hrs Total = 47 Hrs	**SEE Duration**	3 Hours for 100 marks

Course learning objectives

1. To introduce the functions of operating system, design, structure and associated system calls.
2. To study and analyze various scheduling algorithms and process synchronization techniques.
3. To develop an understanding about deadlocks and deadlock recovery techniques.
4. To discuss and realize the importance of memory management techniques.
5. To gain the knowledge of file systems and secondary storage structures.

Pre-requisites: Basic knowledge of computer concepts & programming, Computer Organization.

Unit – I 10 Hours

Introduction to Operating System: System structures: What operating systems do; Operating System operations; Process management; Memory management; Storage management; Protection and security; Distributed system; Operating System Services; System calls; Types of system calls; Operating System structure; System boot.
Introduction to UNIX File System: Inside UNIX, Internal and External Commands, Command structure.
Case Study: Android Operating System / iOS

Unit – II 09 Hours

Process Management: Process concept; Process scheduling; Process Scheduling: Basic concepts; Scheduling criteria; Scheduling algorithms.
The Process: Understanding the process, How a process is created, the login shell, init, internal and external commands, ps.

Unit – III 09 Hours

Process Synchronization: Synchronization: The Critical section problem; Peterson's solution; Semaphores; Classical problems of synchronization.
Deadlocks: Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.

Unit – IV 09 Hours

Memory Management: Memory Management Strategies: Background; Swapping; Contiguous memory allocation; Paging; Virtual Memory Management: Background; Demand paging;

Copy-on-write; Page replacement;

Unit – V **10 Hours**

File System: Implementation of File System: File System: File concept; Access methods; Directory structure; File system mounting; File sharing; Protection. Implementing File System: File system structure.

The File System: The parent child relationship, The UNIX file system, Absolute Pathnames, Relative Pathnames, pwd, cd, mkdir, rmdir, cp, rm, mv, cat. **File Attributes:** ls, ls-l, ls-d, file permissions, chmod.

Books

Text Books:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Principles", Wiley India, 6th edition and onwards.
2. Sumitabha Das: "YOUR UNIX – The Ultimate Guide" , Tata McGraw Hill, 23rd reprint , 2012 and onwards.

Reference Books:

1. Gary Nutt, "Operating System", Pearson Education, 2nd edition and above.
2. Harvey M Deital, "Operating system", Addison Wesley, 2nd edition and above.
3. D.M Dhamdhere, "Operating System", "A concept based Approach", Tata McGraw-Hill, 2nd edition and onwards.
4. Behrouz A. Forouzan and Richard F. Gilberg: "UNIX and Shell Programming ", Cengage Learning, 2005 and onwards.

E-resourses (NPTEL/SWAYAM)

1. **https://onlinecourses.nptel.ac.in/**

Course Outcome (COs)

At the end of the course, the student will be able to	Bloom's Level
1. **Explain** the computer system resources and the role of an operating system in managing those resources.	**L2**
2. **Develop** applications keeping concurrency and synchronization, semaphores, Monitors, sharedmemory, **mutual** exclusion, process scheduling services of general operating system in the mind.	**L3**
3. **Describe and analyze memory** management, file management and secondary Memory Management techniques**.**	**L3**
4. **Discuss** UNIX shell commands for file handling , process control and do the case study on on Android Operating System / iOS.	**L2**

Program Outcome of this course (POs)	**PO No.**
1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	**PO1**
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	**PO2**

Course delivery methods	Assessment methods
1. Lecture & Board	1. Assignments
2. Power-point Presentation	2. Quizzes
3. Online Videos / Learning	3. Internal Assessment Tests
4. NPTEL / Edusat	4. Course Seminar
5. Class Room Exercises	5. Course Project (Mini project)
	6. Case Studies

Scheme of Continuous Internal Evaluation (CIE):

Components	Addition of two IA tests	Average of two assignments	Quiz/Seminar/Course Project	Total Marks
Maximum marks :50	15+15 = 30	10	10	50
Writing two IA tests is compulsory. Minimum marks required to qualify for SEE : 20 out of 50 marks				

Semester End Examination (SEE):

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.