

Course Name : Computer Engineering Group
Course Code : CO/CD/CM/CW/IF
Semester : Fifth for CO/CM/IF/CW and Sixth for CD
Subject Title : Operating System
Subject Code : 17512

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	--	--	25@	125

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

Rationale:

Operating system is the software that makes a computers system operational. It is an interface between the human and machine. It drives all the hardware parts of the computer and is the first piece of software to run on the machine when the system boots.

OS is a core technology subject, the knowledge of which is mandatory for every user. If familiarizes a learner with the OS concepts, structure internal functionality and services and resource sharing. It will help a learner with OS design concepts. This subject will give a learner an overview of UNIX / LINUX OS.

General Objectives:

To develop following skills:

Intellectual skills:

1. Learn the various milestones in the history of Operating Systems and various Generations of computers as well as the modern trends in Operating Systems.
2. Understand the kernel architectures, the functions of operating systems and the use of system calls.
3. Understand the concept of processes, multiprogramming, Process Control Blocks, context switching.
4. Learn about the scheduler and implement various scheduling algorithms.
5. Understand about Deadlocks, Inter-process communications.
6. Learn about Memory Management and File Management techniques of the OS.
7. Understand the structure and file system structure of Unix OS.
8. Use UNIX commands, vi editor and file utilities and write shell scripts.

Contents: Theory

Topic No.	Contents	Hours	Marks
01	<p>Introduction: Objectives:</p> <ul style="list-style-type: none"> ➤ Distinguish between various generation of computer. ➤ Classify different types of operating system. <p>1.1 Operating System - Evaluation, Generations 1st, 2nd, 3rd 1.2 Different Types of Operating systems- Batch operating system, Multi Programmed, Multitasking, Time Shared OS. Multiprocessor Systems, Distributed Systems, Cluster Systems, Real time systems.</p>	04	12
02	<p>Operating System Structures: Objectives:</p> <ul style="list-style-type: none"> ➤ State services & functions of Operating Systems. ➤ Use system calls ➤ Distinguish between different kernel architecture. <p>2.1 Different Services of Operating System. 2.2 System Calls- Concept, Types and Uses 2.3 Simple Structure, Layered, Monolithic, Microkernel. 2.4 Components activities- Process Management, Main Memory Management, File Management, I/O System management, Secondary storage management.</p>	08	18
03	<p>Process Management : Objectives:</p> <ul style="list-style-type: none"> ➤ Describe Process, process scheduling, schedulers. ➤ Describe inter-process communication & synchronization. ➤ Describe critical section problem & solution to ensure the consistency of shared data ➤ Describe multithreading models. <p>3.1 Process-Concept, process states, Process Control Block. 3.2 Process Scheduling- Scheduling Queues, Schedulers, Context switch. 3.3 Inter-process communication- Introduction, shared memory system & message passing system, critical section problem, semaphores. 3.4 Threads - Benefits, users and kernel threads, Multithreading Models - Many to One, One to One, Many to Many.</p>	10	22
04	<p>Scheduling : Objectives:</p> <ul style="list-style-type: none"> ➤ Describe CPU scheduling. ➤ Describe various CPU-scheduling algorithms. ➤ Solve problems based on them. ➤ Describe deadlock and its algorithm. <p>4.1 Scheduling & its types - Objectives, concept, CPU and I/O burst cycles, Pre-emptive, Non- Pre-emptive Scheduling, Scheduling criteria. 4.2 Types of Scheduling algorithms - First come first served (FCFS), Shortest Job First (SJF), Shortest Remaining Time(SRTN), Round Robin (RR) Priority scheduling, multilevel queue scheduling 4.3 Deadlock - System Models, Necessary Conditions leading to Deadlocks, Deadlock Handling - Preventions, avoidance, Banker's algorithm</p>	10	20

05	File System and Memory Management : Objectives: <ul style="list-style-type: none"> ➤ Distinguish between memory allocation methods ➤ Distinguish between various file access methods. ➤ Describe files, file attributes and file structure. 5.1 Basic Memory Management - Partitioning, Fixed and Variable, Free Space management Techniques - Bitmap, Linked List. 5.2 Virtual Memory – Concept, Segmentation, Paging, Page table, Page fault. 5.3 File – Concepts, Attributes Operations, Types, and File System Structure. 5.4 Access Methods – Sequential, Direct, Swapping, File Allocation Methods- Contiguous, Linked, Indexed. 5.5 Directory Structure – Single level, Two levels.	10	20
06	UNIX : A Case Study Objectives: <ul style="list-style-type: none"> ➤ Draw system structure and file system structure of UNIX ➤ Distinguish between UNIX and LINUX system Introduction, Overview of UNIX, Structure of UNIX OS, Booting, File System Of UNIX, UNIX and LINUX Comparison.	06	08
Total		48	100

List of Practical:

Sr. No.	Title of Experiment	No. of Hours
1	Differentiate between various Operating System	02
2	Use of file processing and Communication command – tr, wc, cut, paste, sort	02
3	Use of file processing and Communication command- who, who am I, mesg, talk, wall, write, news, mail.	02
4	Use of general purpose and process commands- date, time, cal, clear, banner	02
5	Use of general purpose and process commands- , tty, man, bc, ps, wait, sleep, exit, kill.	02
6	Work with file and directory commands viz, pwd, cat, ls, cd, mkdir, rmdir, rm, mv	02
7	Work with file and directory commands viz cp, join, split, head, tail, omm., pr, chmod, cmp.	02
8	Use of vi editor and editor commands	04
9	Write and execute menu driven shell scripts using case structures(any two)	02
10	Write and program to implement the Shortest Job First algorithm.	04
11	Write and program to implement the Priority scheduling algorithm.	04
12	Write and program to implement the Round-Robin algorithm.	04

****Students can perform any ten practical**

Learning Recourses:**1. Books:**

Sr. No	Book Title	Author	Publication
01	Operating System Concepts- VIII th Edition	Silberschatz Galvin	John Wiley and Sons
02	Operating System	Achyut S. Godbole	Tata McGraw Hill
03	Operating System	William Stallings	Pearson
04	Modern Operating systems	Andrew tanenbaum-3 rd edition	PHI
05	Unix Concept and Programming	Sumitabha Das	Tata McGraw Hill
06	UNIX Programming	Kumar Saurabh	Wiley India

2. Websites:

1. [cs.wisc.edu/~ bart/537](http://cs.wisc.edu/~bart/537) lecture notes-University of Wisconsin Madison.
2. www.cs.kent.edu/osfo3/notes/index.html- Vilinius Gediminas Technical University
3. <http://www.howstuffworks.com/operating-system1.htm>
4. www.computerhope.com/jargon/o/os.htm
5. [en.wikipedia.org/wiki/Operating system](http://en.wikipedia.org/wiki/Operating_system)

Demo lectures with power point presentations using LCD projector should be arranged to develop programming concepts of students.