Name of Faculty	:	Faculty of Computer Science & Applications
Name of Program	:	Master of Computer Application with Cyber Security
Course Code	:	1MCA01
Course Title	:	Operating System
Type of Course	:	Professional Core
Year of Introduction	:	2023-24

Prerequisite	:	**-**
Course Objective	:	This Course will enhance the students understanding for OS
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	Analyse the structure of OS and basic architectural components involved in OS design
	CO2	Compare and contrast various CPU scheduling algorithms.
	CO3 CO4	Evaluate the requirements for the process synchronization and co-ordination in contemporary operating system.
	CO5	Analyze various algorithms for memory management, I/O management and security aspects of operating system.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	SEE	CIA	SEE	CIA	
2	0	2	3	70	30	30	20	150

*Legends: **L**-Lecture; **T**–Tutorial/Teacher Guided Theory Practice; **P**–Practical,**C** – Credit, **SEE** – Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations /MCQ Tests, etc.))*

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping With CO
1	**Introduction:** Computer system overview, Architecture, Goals & Structures of O.S, Basic functions, Interaction of O.S. & hardware architecture, System calls, Batch, multiprogramming. Multitasking, time sharing, parallel, distributed & real-time O.S.	4	10%	CO1
2	**Process and Threads Management:** Process Concept, Process states, Process control, Threads, Uni-processor Scheduling: Types of scheduling: Preemptive, Non preemptive, Scheduling algorithms: FCFS, SJF, RR, Priority, Thread Scheduling, Real Time Scheduling. System calls like ps, fork, join, exec family, wait.	4	10%	CO2, CO1

3	**Concurrency:** Principles of Concurrency, Mutual Exclusion: S/W approaches, H/W Support, Semaphores, Pipes, Message Passing, Signals, Monitors.	3	10%	CO3
4	**Inter Process Communication:** Race Conditions, Critical Section, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc., Scheduling, Scheduling Algorithms.	4	10%	CO4
5	**Deadlock:** Principles of Deadlock, Starvation, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, System calls.	2	10%	CO4
6	**Memory Management:** Memory Management requirements, Memory partitioning: Fixed and Variable Partitioning, Memory Allocation: Allocation Strategies (First Fit, Best Fit, and Worst Fit), Swapping, Paging and Fragmentation. Demand Paging, Security Issues. **Virtual Memory:** Concepts, VM management, Page Replacement Policies (FIFO, LRU, Optimal, Other Strategies), Thrashing.	4	10%	CO4
7	**I/O Management & Disk scheduling:** I/O Devices, Organization of I/O functions, Operating System Design issues, I/O Buffering, Disk Scheduling (FCFS, SCAN, C-SCAN, SSTF), RAID, Disk Cache.	4	10%	CO5
8	**Security & Protection:** Security Environment, Design Principles Of Security, User Authentication, Protection Mechanism : Protection Domain, Access Control List	4	10%	CO5
9	**Unix/Linux Operating System:** Development Of Unix/Linux, Role & Function Of Kernel, System Calls, Elementary Linux command & Shell Programming, Directory Structure, System Administration Case study: Linux, Windows Operating System	4	10%	CO5
10	**Virtualization Concepts:** Virtual machines; supporting multiple operating systems simultaneously on a single hardware platform; running one operating system on top of another. True or pure virtualization.	2	10%	CO5

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	**30%**	**35%**	**25%**	**-**	**-**	**-**

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment	Teaching Hours
1	Study of Advance commands and filters of Linux/UNIX.	1
2	Write a shell script to generate marksheet of a student. Take 3 subjects, calculate and display total marks, percentage and Class obtained by the student.	1
3	Write a shell script to display multiplication table of given number	1
4	Write a shell script to find factorial of given number n.	1
5	Write a shell script which will accept a number b and display first n prime numbers as output.	1
6	Write a shell script which will generate first n fibonnacci numbers like: 1, 1, 2, 3, 5, 13, …	1
7	Write a menu driven shell script which will print the following menu and execute the given task. i. Display calendar of current month ii. Display today's date and time iii. Display usernames those are currently logged in the system iv. Display your name at given x, y position v. Display your terminal number	1
8	Write a shell script to read n numbers as command arguments and sort them in descending order.	1
9	Write a shell script to display all executable files, directories and zero sized files from current directory.	1
10	Write a shell script to check entered string is palindrome or not.	1
11	Shell programming using filters (including grep, egrep, fgrep)	1
12	Study of Unix Shell and Environment Variables.	1
13	Write a shell script to validate the entered date. (eg. Date format is : dd-mm-yyyy).	1
14	Write an awk program using function, which convert each word in a given text into capital.	1
15	Write a program for process creation using C. (Use of gcc compiler).	1
16	Study of Basic commands of LinuxIUNIX.	1
17	Study of Advance commands and filters of LinuxIUNIX.	1
18	Write a shell script to generate marksheet of a student. Take 3 subjects, calculate and display total marks, percentage and Class obtained by the student.	1
19	Write a shell script to display multiplication table of given number	1
20	Write a shell script to find factorial of given number n.	1

21	Write a shell script which will accept a number b and display first n prime numbers as output.	1
22	Write a shell script which will generate first n fibonnacci numbers like: 1, 1, 2, 3, 5, 13,	1
23	Write a menu driven shell script which will print the following menu and execute the given task. i. Display calendar of current month ii. Display today's date and time iii. Display usernames those are currently logged in the system iv. Display your name at given x, y position v. Display your terminal number	1
24	Write a shell script to read n numbers as command arguments and sort them in descending order.	1
25	Write a shell script to display all executable files, directories and zero sized files from current directory.	1
26	Write a shell script to check entered string is palindrome or not.	1
27	Shell programming using filters (including grep, egrep, fgrep)	1
28	Study of Unix Shell and Environment Variables.	1
29	Write a shell script to validate the entered date. (eg. Date format is : dd-mm-yyyy).	1
30	Write an awk program using function, which convert each word in a given text into capital.	1
31	Write a program for process creation using C. (Use of gcc compiler).	1
32	Study of Advance commands and filters of Linux/UNIX.	1
33	Write a shell script to generate marksheet of a student. Take 3 subjects, calculate and display total marks, percentage and Class obtained by the student.	1
34	Write a shell script to display multiplication table of given number	1
35	Write a shell script to find factorial of given number n.	1
36	Write a shell script which will accept a number b and display first n prime numbers as output.	1
37	Write a shell script which will generate first n fibonnacci numbers like: 1, 1, 2, 3, 5, 13, …	1
38	Write a menu driven shell script which will print the following menu and execute the given task. i. Display calendar of current month ii. Display today's date and time iii. Display usernames those are currently logged in the system iv. Display your name at given x, y position	1

Major Equipment/ Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Linux/Unix OS

Reference Books

Sr. No.	Name of Reference Books
1	Operating Systems: Internals & Design Principles, 9th Edition, William Stallings, Pearson Education India
2	Operating System Concepts, 9th edition Peter B. Galvin, Greg Gagne, Abraham Silberschatz, John Wiley & Sons, Inc.
3	Modern Operating Systems-By Andrew S. Tanenbaum (PHI)