

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

Scheme: 2023-24, Syllabus: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	III		
Name of the Course	Operating Systems		
Course Code	B23-CSE-301		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC-3/MCC-4		
Level of the course (As per Annexure-I	200-299		
Pre-requisite for the course (if any)	Basic Knowledge of Computer		
Course Learning Outcomes(CLO):	After completing this course, the learner will be able to: 1. understand the basic concepts of operating systems and their services along with process management. 2. understand the concept of process scheduling and acquire knowledge of process synchronization. 3. learn about memory management and virtual memory concepts. 4. learn to work with directory structure and security aspects. 5*. to implement the programs based on operating systems.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	3	2	5
Max. Marks:100(70(T)+30(P)) Internal Assessment Marks:30(20(T)+10(P)) End Term Exam Marks: 70(50(T)+20(P))		Time: 3 Hrs.(T), 3Hrs.(P)	
Part B- Contents of the Course			
Instructions for Paper- Setter			
Examiner will set a total of nine questions. Out of which first question will be compulsory. Remaining eight questions will be set from four unit selecting two questions from each unit. The			

examination will be of three-hour duration. All questions will carry equal marks. The first question will comprise short answer-type questions covering the entire syllabus.

The candidate will have to attempt five questions in all, selecting one question from each unit. The first question will be compulsory.

The practicum will be evaluated by an external and an internal examiner. The examination will be of three-hour duration.

Unit	Topics	Contact Hours
I	Introductory Concepts: Operating System, Functions and Characteristics, Historical Evolution of Operating Systems, Operating System Structure. Types of Operating System: Real-time Multiprogramming, Multiprocessing, Batch processing. Operating System Services, Operating System Interface, Service System Calls, and System Programs. Process Management: Process Concepts, Operations on Processes, Process States, and Process Control Block. Inter-Process Communication.	11
II	CPU Scheduling: Scheduling Criteria, Levels of Scheduling, Scheduling Algorithms, Multiple Processor Scheduling, Algorithm Evaluation. Synchronization: Critical Section Problem, Semaphores, Classical Problem of Synchronization, Monitors. Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery.	12
III	Memory Management Strategies: Memory Management of Single-User and Multiuser Operating Systems, Partitioning, Swapping, Contiguous Memory Allocation, Paging and Segmentation; Virtual Memory Management: Demand Paging, Page Replacement Algorithms, Thrashing.	11
IV	Implementing File System: File System Structure, File System Implantation, File Operations, Type of Files, Directory Implementation, Allocation Methods, and Free Space Management. Disk Scheduling algorithm- SSTF, Scan, C- Scan, Look, C-Look. SSD Management.	11
V*	Practicum: Students are advised to do laboratory/practical practice not limited to but including the following types of problems: - Working with various operating systems, and performing different operations using operating systems. - Write a program to print file details including owner access permissions, and file access time, where file name is given as argument. - Write a program to copy files using system calls.	30

	• Write a program to implement the FCFS scheduling algorithm. • Write a program to implement the Round Robin scheduling algorithm. • Write a program to implement the SJF scheduling algorithm. • Write a program to implement a non-preemptive priority-based scheduling algorithm. • Write a program to implement a preemptive priority-based scheduling algorithm. • Write a program to implement the SRJF scheduling algorithm. • Write a program to calculate the sum of n numbers using the thread library. • Write a program to implement first-fit, best-fit, and worst-fit allocation strategies.	
Suggested Evaluation Methods		
Internal Assessment: ➤ Theory • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 ➤ Practicum • Class Participation: NA • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 • Mid-Term Exam: NA		End Term Examination: A three-hour exam for both theory and practicum.
Part C-Learning Resources		
Recommended Books/e-resources/LMS: • Silberschatz A., Galvin P.B., and Gagne G., Operating System Concepts, John Wiley & Sons. • Godbole, A.S., Operating Systems, Tata McGraw-Hill Publishing Company, New Delhi. • Deitel, H.M., Operating Systems, Addison- Wesley Publishing Company, New York. • Tanenbaum, A.S., Operating System- Design and Implementation, Prentice Hall of India, New Delhi.		

*Applicable for courses having practical component.