DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA

Session: 2023-24	
Part A-Introduction	
Subject	BCA
Semester	II
Name of the Course	Concepts of Operating Systems
Course Code	B23-CAP-203 (Common with B23-CAI-203, B23-CDS-203, B23-CTS-203)
Course Type: (CC/MCC/MDC /CC-M/DSEC/VOC/DSE/PC/AEC/ VAC)	CC
Level of the course (As per Annexure-I	100-199
Pre-requisite for the course (if any)	
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 the operating system.

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), 3 Hrs.(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. Examination will be of three-hour duration. All questions will carry equal marks. First question

willcompriseshortanswer-typequestionscoveringthe entiresyllabus.
The candidatewillhavetoattemptfivequestionsinall,selectingonequestionfromeachunit.Firstquestionwilbecompulsory.
The practicumwillbeevaluatedbyanexternalandaninternalexaminer.The examinationwillbeofthree-hourduration.

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.	10
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.	10
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.	10
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.	10
V*	Practicum: Students are advised to do laboratory/practical practice not limited tobut includingthefollowingtypes ofproblems: • 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.	25

	- 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 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.	

SuggestedEvaluationMethods	
InternalAssessment: ➢ **Theory** • ClassParticipation:5 • Seminar/presentation/assignment/quiz/classtestetc.:5 • Mid-TermExam:10 ➢ **Practicum** • ClassParticipation:5 • Seminar/Demonstration/Viva-voce/Labrecordsetc.:5 • Mid-TermExam: NA	**End-TermExamination:**A three-hourexam for boththeory andpracticum. **EndTermExamMarks:70(50(T)+20(P))**

PartC-LearningResources
RecommendedBooks/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.

*Applicableforcourseshavingpractical components.