

**DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS
KURUKSHETRA UNIVERSITY, KURUKSHETRA**

Session: 2023-24			
Part A - Introduction			
Subject	COMPUTER SCIENCE		
Semester	III		
Name of the Course	Operating Systems		
Course Code	B23-CSE-301 (Common with B23-CAC-102)		
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)	Basic Knowledge of Computer		
Course Learning Outcomes(CLO):	<p>After completing this course, the learner will be able to:</p> <ol style="list-style-type: none"> 1. understand the basic concepts of operating systems and its services along with process management. 2. understand 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. <hr/> <p>5*. to implement the programs based on operating systems.</p>		
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			
<u>Instructions for Paper- Setter</u>			
<p>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 will comprise of short answer type questions covering entire syllabus.</p> <p>Candidate will have to attempt five questions in all, selecting one question from each unit. First question will be compulsory.</p>			

Practicum will be evaluated by an external and an internal examiner. Examination will be of three-hour duration.		
Unit	Topics	Contact Hours
I	<p>Introductory Concepts: Operating System, Functions and Characteristics, Historical Evolution of Operating Systems, Operating System Structure.</p> <p>Types of Operating System: Real time, Multiprogramming, Multiprocessing, Batch processing.</p> <p>Operating System Services, Operating System Interface, Service System Calls, System Programs.</p> <p>Process Management: Process Concepts, Operations on Processes, Process States and Process Control Block. Inter-Process Communication.</p>	10
II	<p>CPU Scheduling: Scheduling Criteria, Levels of Scheduling, Scheduling Algorithms, Multiple Processor Scheduling, Algorithm Evaluation.</p> <p>Synchronization: Critical Section Problem, Semaphores, Classical Problem of Synchronization, Monitors.</p> <p>Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery.</p>	10
III	<p>Memory Management Strategies: Memory Management of Single-User and Multiuser Operating System, Partitioning, Swapping, Contiguous Memory Allocation, Paging and Segmentation;</p> <p>Virtual Memory Management: Demand Paging, Page Replacement Algorithms, Thrashing.</p>	10
IV	<p>Implementing File System: File System Structure, File System Implantation, file operations, Type of Files, Directory Implementation, Allocation Methods, and Free Space Management.</p> <p>Disk Scheduling algorithm- SSTF, Scan, C- Scan, Look, C-Look.</p> <p>SSD Management.</p>	10
V*	<p>Practicum:</p> <p>Students are advised to do laboratory/practical practice not limited to, but including the following types of problems:</p> <ul style="list-style-type: none"> • Working with various operating systems, and performing different operations using operating system. • Write a program to print file details including owner access permissions, file access time, where file name is given as argument. • Write a program to copy files using system calls. • Write a program to implement FCFS scheduling algorithm. • Write a program to implement Round Robin scheduling algorithm. • Write a program to implement SJF scheduling algorithm. • Write a program to implement non-preemptive priority based scheduling algorithm. 	25

	<ul style="list-style-type: none"> • Write a program to implement preemptive priority based scheduling algorithm. • Write a program to implement SRJF scheduling algorithm. • Write a program to calculate sum of n numbers using thread library. • Write a program to implement first-fit, best-fit and worst-fit allocation strategies. 	
Suggested Evaluation Methods		
<p>Internal Assessment:</p> <p>➤ Theory</p> <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10 <p>➤ Practicum</p> <ul style="list-style-type: none"> • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • Mid-Term Exam: NA 	<p>End Term Examination:</p> <p>A three hour exam for both theory and practicum.</p>	
Part C-Learning Resources		
<p>Recommended Books/e-resources/LMS:</p> <ul style="list-style-type: none"> • 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.