Rajiv Gandhi Govt. College Saha (AMBALA)

(Affiliated to Kurukshetra University, Kurukshetra)

('B+' Grade, NAAC Accrediated)

|| तमसो मा ज्योतिर्गमय ||
"अंधेरे से मुझे प्रकाश की ओर ले चलो"
"From darkness, Lead me to Light"

Course File (Scheme, Syllabus and Lesson Plan)

Operating Systems (CC)

(B23-CSE-301)

According to
Curriculum Framework for Under-Graduate Programmes

As per NEP-2020 (Multiple Entry-Exit, Internships and Choice Based Credit System)

DEPARTMENT OF COMPUTER SCIENCE & APPLICATIONS

(For the Batches Admitted from 2023-2024)

Name of the Teacher: Dr. Rajeev Goel

Class: BSc.-II
Session: July-Nov 2025
Internal Marks: 30 (20(T) +10(P))

Subject: Operating Systems
Semester: 3rd **Sem**
External Marks: 70(50(T)+20(P))

Part A Introduction	
Subject	COMPUTER SCIENCE
Semester	I
Name of the Course	Operating Systems
Course Code	B23-CSE-301 (Common with B23-CAC-102)
Course Type:(CC/MCC/MDC/CCM/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 Objectives	The course will aim: 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. 5. to implement the programs based on operating systems.
Course Learning Outcomes(CLO)	**CLO1:** Demonstrate an understanding of the basic concepts of operating systems, their services, and the fundamentals of process management. **CLO2:** Understand and apply the principles of process scheduling and process synchronization in operating systems. **CLO3:** Explain and implement memory management techniques, including the concept of virtual memory and its management. **CLO4:** Analyze and navigate directory structures, along with understanding the security mechanisms and permissions in an operating system. **CLO5:** Develop and implement programs that interact with and utilize operating system functionalities.

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: 3Hrs.(T), 3Hrs.(P)**

Aug-Nov 2025
Operating Systems

Part B-Contents of the Course

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, 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 System, 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 to, but including the following types of problems: • 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. • 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.	25

Suggested Evaluation Methods

Theory: • Class Participation: 5 • Seminar/presentation/assignment/quiz/class test etc.: 5 • Mid-Term Exam: 10	**End Term Examination:** A three hour exam for both theory and practicum.
Practicum: • Class Participation: 5 • Seminar/Demonstration/Viva-voce/Lab records etc.: 5 • Mid-Term Exam: NA	

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.

Dr. Rajeev Goel

Principal
Rajiv Gandhi Government College
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Principal

Lesson Plan
Operating Systems

Month	Week	Topic	Remarks
Aug 2025	1	Introduction to Operating System, Functions and Characteristics, Historical Evolution of Operating Systems	
	2	Operating System Structure, Real time, Multiprogramming, Multiprocessing, Batch processing. Operating System Services	
	3	Operating System Interface, Service System Calls, System Programs.	
	4	Process Concepts, Operations on Processes, Process States and Process Control Block, Inter-Process Communication	**Class Test**
Sep-2025	1	Scheduling Criteria, Levels of Scheduling, Scheduling Algorithms	
	2	Multiple Processor Scheduling, Algorithm Evaluation	
	3	Synchronization: Critical Section Problem, Semaphores, Classical Problem of Synchronization, Monitors	
	4	Deadlocks: Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery	**Class Test**
Oct-2025	1	Memory Management of Single- User and Multiuser Operating System, Swapping, Contiguous Memory Allocation	
	2	Paging and Segmentation; Virtual Memory Management: Demand Paging	**Mid-Term Exams**
	3	**Diwali Vacations**	
	4	Page Replacement Algorithms, Thrashing	
Nov-2025	1	File System Structure, File System Implantation	
	2	file operations, Type of Files, Directory Implementation, Allocation Methods, and Free Space Management	
	3	Disk Scheduling algorithm- SSTF, Scan, C- Scan, Look, C-Look. SSD Management	**Class Test**
	4	**University Exams**	

Assignment-I
Q1. What is operating system? Explain its various functions.
Q2. Explain various types of operating systems.
Q3. Define process & PCB. Explain various process states.
Q4. Explain FCFS, SJF and RR cpu scheduling algorithms with suitable examples.
Q5. Explain deadlock and its characteristics. Explain Banker's algorithm for deadlock avoidance.

Assignment-II
Q1. Explain continuous vs non-continuous memory allocation methodology.
Q2. Explain various page replacement algorithms with suitable examples.
Q3. Explain SSTF, Scan, C- Scan, Look, C-Look disk scheduling algorithms.
Q4. Explain critical section problem. Also explain dining philosopher's problem.

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