

INSTITUTE OF AERONAUTICAL ENGINEERING

Dundigal, Hyderabad - 500 043

COMPUTER SCIENCE AND ENGINEERING

COURSE DESCRIPTION FORM

Course Title	OPERATING SYSTEMS LAB			
Course Code	A50589			
Regulation	R13 - JNTUH			
Course Structure	Lectures	Tutorials	Practicals	Credits
Course Structure	-	-	3	2
Course Coordinator	Ms. G Sunitha, Associate Professor, CSE			
Team of Instructors	Mr. K Chiranjeevi, Assistant Professor, CSE Ms. M Bhavya, Assistant Professor, CSE			

I. COURSE OVERVIEW:

This lab complements the operating systems course. Students will gain practical experience with designing and implementing concepts of operating systems such as system calls, CPU scheduling, process management, memory management, file systems and deadlock handling using C language in Linux environment.

II. PREREQUISITE(S):

Level	Credits	Periods/ Week	Prerequisites
UG	2	3	Operating Systems, Computer Programming, Data Structures

III. MARKS DISTRIBUTION:

Sessional Marks	End Semester Exam	Total Marks
There shall be a continuous evaluation during the semester for 25 marks. Day-to-day work in the laboratory shall be evaluated for 15 marks and internal practical examination conducted by the concerned teacher shall be evaluated for 10 marks.	50	75

IV. EVALUATION SCHEME:

S. No	Component	Duration	Marks
1.	Day-to-day Evaluation	-	15
2.	Internal Practical Examination	2.5 hours	10
5.	End Semester Examination	2.5 hours	50

V. COURSE OBJECTIVES:

At the end of the course, the students will be able to:

I. Be familiar the design aspects of operating system.

- II. Master internals of OS system call implementation.
- III. Be competent with CPU scheduling and process management.
- IV. To design and apply the memory management concepts.
- V. Be competent with internals of file systems.

VI. COURSE OUTCOMES:

At the end of the laboratory course the students are able to:

- 1. **Understand** and implement basic services and functionalities of the operating system using system calls.
- 2. Use modern operating system calls and synchronization libraries in software/ hardware interfaces.
- 3. **Understand** the benefits of thread over process and implement synchronized programs using multithreading concepts.
- 4. Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.
- 5. **Implement** memory management schemes and page replacement schemes.
- 6. Simulate file allocation and organization techniques.
- 7. **Understand** the concepts of deadlock in operating systems and implement them in multiprogramming system.

VII. COURSE PLAN

Division of Experiments	List of Experiments				
	Week - 1 Consider the in millisecond	following se ls:	t of process	ses, with the len	gth of the CPU burst given
		Process	Burst Time	Priority	_
		P1	10	3	
		P2	1	1	
		P3	2	3	
		P4	1	4	
		P5	5	2	
CPU Scheduling Algorithms	 Write a C program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time for the above problem. (a) FCFS (b) SJF Week - 2 1) Write a C program to simulate the following preemptive CPU scheduling algorithms to find turnaround time and waiting time for the above problem. (a) Round Robin (b) Priority 				
	2) *Write a C program to simulate multi-level queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories – system processes and user processes. System processes are to be given higher priority than user processes. The priority of each process ranges from 1 to 3. Use fixed priority scheduling for all the processes.				
File Allocation Strategies	Week - 3 Write a C pro (a) Sequential	gram to sim (b) Inde	ulate the fol exed (c)	lowing file alloo Linked	cation strategies.

Memory Management Techniques 1) Write a C program to simulate the MVT and MFT memory management techniques. 2) *Write a C program to simulate the following contiguous memory allocation techniques (a) Worst-fit (b) Best-fit (c) First-fit Week - 5 Write a C program to simulate paging technique of memory management. Week - 6 Write a C program to simulate the following file organization techniques (a) Single level directory (b) Two level directory Week - 6 Write a C program to simulate the following file organization techniques (c) Hierarchical Week - 7 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance. Management Techniques Peadlock Management Techniques Page Replacement Algorithms Page Replacement Algorithms Process Synchronization Process Synchronization Mite a C program to simulate page replacement algorithms (a) LFU *(b) Optimal Week - 12 (a) *Write a C program to simulate page replacement algorithms (a) LFU *(b) Optimal Week - 13 *Write a C program to simulate disk scheduling algorithms (a) EFCS Week - 13 *Write a C program to simulate disk scheduling algorithms (a) ECS		Week - 4					
Memory Management Techniques 2) *Write a C program to simulate the following contiguous memory allocation techniques (a) Worst-fit (b) Best-fit (c) First-fit Week - 5 Write a C program to simulate paging technique of memory management. Week - 6 Write a C program to simulate the following file organization techniques (a) Single level directory (b) Two level directory (c) Hierarchical Week - 7 Write a C program to simulate the following file organization techniques (c) Hierarchical Week - 8 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance. Week - 9 Write a C program to simulate Bankers algorithm for the purpose of deadlock prevention. Page Replacement Algorithms (a) FIFO (b) LRU Week - 10 Write a C program to simulate page replacement algorithms (a) FIFO (b) LRU Process Synchronization Algorithms a) *Write a C program to simulate the concept of Dining-Philosophers problem. b) *Write a C program to simulate disk scheduling algorithms a) FCFS b) *CAN c) C-SCAN		1) Write a C program to simulate the MVT and MFT memory management					
Management Techniques 2) *Write a C program to simulate the following contiguous memory allocation techniques (a) Worst-fit (b) Best-fit (c) First-fit Week - 5 Write a C program to simulate paging technique of memory management. Week - 6 Write a C program to simulate the following file organization techniques (a) Single level directory (b) Two level directory Week - 7 Write a C program to simulate the following file organization techniques (c) Hierarchical Week - 8 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance. Week - 9 Write a C program to simulate Bankers algorithm for the purpose of deadlock prevention. Week - 10 Write a C program to simulate page replacement algorithms (a) FIFO (b) LRU Week - 11 Write a C program to simulate page replacement algorithms (a) LFU *(b) Optimal Week - 12 a) *Write a C program to simulate the concept of Dining-Philosophers problem. Write a C program to simulate disk scheduling algorithms Week - 13 Write a C program to simulate disk scheduling algorithms (c) ECS(A) (c) SCAN 	Momony	techniques.					
Management Techniques allocation techniques (a) Worst-fit (b) Best-fit (c) First-fit Week - 5 Write a C program to simulate paging technique of memory management. File Organization Techniques Week - 6 Wite a C program to simulate the following file organization techniques (a) Single level directory (b) Two level directory Week - 7 Write a C program to simulate the following file organization techniques (c) Hierarchical Week - 8 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance. Week - 9 Write a C program to simulate Bankers algorithm for the purpose of deadlock prevention. Week - 10 Write a C program to simulate page replacement algorithms (a) FIFO (b) LRU Week - 11 Write a C program to simulate page replacement algorithms (a) LFU *(b) Optimal Week - 12 *Write a C program to simulate the concept of Dining-Philosophers problem. Week - 13 Wite a C program to simulate disk scheduling algorithms (c) FCS (c) SCAN (c) SCAN 	Managamant	2) *Write a C program to simulate the following contiguous memory					
Image: Process Synchronization (a) Worst-fit (b) Best-fit (c) First-fit Week - 5 Write a C program to simulate paging technique of memory management. Week - 6 Write a C program to simulate the following file organization techniques (a) Single level directory (b) Two level directory Week - 7 Write a C program to simulate the following file organization techniques (c) Hierarchical Week - 8 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance. Week - 9 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance. Page Replacement Algorithms Week - 10 Write a C program to simulate page replacement algorithms (a) EIFO (b) LRU Week - 11 Write a C program to simulate page replacement algorithms (a) LFU *(b) Optimal *Week - 12 a) *Write a C program to simulate the concept of Dining-Philosophers problem. Week - 13 Wite a C program to simulate disk scheduling algorithms a) ECES Week - 13	Tanagement	allocation techniques					
Week - 5 Write a C program to simulate paging technique of memory management. File Organization Techniques (a) Single level directory (b) Two level directory Week - 7 Write a C program to simulate the following file organization techniques (c) Hierarchical Week - 8 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance. Week - 9 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance. Week - 9 Write a C program to simulate Bankers algorithm for the purpose of deadlock prevention. Week - 10 Write a C program to simulate page replacement Algorithms (a) FIFO (b) LRU Week - 11 Write a C program to simulate page replacement algorithms (a) LFU *(b) Optimal Week - 12 (a) *Write a C program to simulate producer-consumer problem using semaphores. (b) *Write a C program to simulate disk scheduling algorithms a) *Write a C program to simulate disk scheduling algorithms a) *Write a C program to simulate disk scheduling algorithms	Techniques	(a) Worst-fit (b) Best-fit (c) First-fit					
Write a C program to simulate paging technique of memory management. Week - 6 Write a C program to simulate the following file organization techniques (a) Single level directory (b) Two level directory Write a C program to simulate the following file organization techniques (c) Hierarchical Week - 8 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance. Week - 9 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance. Week - 9 Write a C program to simulate page replacement Algorithms Page Replacement Algorithms Process Synchronization Process Synchronization Disk Scheduling Algorithms Write a C program to simulate the concept of Dining-Philosophers problem. Week - 13 "Write a C program to simulate disk scheduling algorithms a) ECES		Week - 5					
File Organization Techniques Week - 6 Write a C program to simulate the following file organization techniques (a) Single level directory (b) Two level directory Deadlock Management Techniques Week - 7 Write a C program to simulate the following file organization techniques (c) Hierarchical Deadlock Management Techniques Week - 8 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance. Page Replacement Algorithms Week - 10 Write a C program to simulate page replacement algorithms (a) FIFO (b) LRU Process Synchronization Week - 12 a) *Write a C program to simulate page replacement algorithms (a) LFU *(b) Optimal Disk Scheduling Algorithms Week - 13 *Write a C program to simulate disk scheduling algorithms a) ECES		Write a C program to simulate paging technique of memory management.					
File Organization TechniquesWrite a C program to simulate the following file organization techniques (a) Single level directory (b) Two level directoryDeadlock Management TechniquesWeek - 7 Write a C program to simulate the following file organization techniques (c) HierarchicalDeadlock Management TechniquesWeek - 8 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance.Page Replacement AlgorithmsWeek - 10 Write a C program to simulate page replacement algorithms (a) FIFO (b) LRUProcess SynchronizationWeek - 12 a) *Write a C program to simulate page replacement algorithms (a) LFU *(b) OptimalDisk Scheduling AlgorithmsWeek - 13 *Write a C program to simulate disk scheduling algorithms a) ECES		Week - 6					
File Organization Techniques (a) Single level directory (b) Two level directory Week - 7 Write a C program to simulate the following file organization techniques (c) Hierarchical Week - 7 Write a C program to simulate the following file organization techniques (c) Hierarchical Deadlock Management Techniques Week - 8 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance. Week - 9 Write a C program to simulate Bankers algorithm for the purpose of deadlock prevention. Week - 10 Write a C program to simulate page replacement algorithms (a) FIFO Page Replacement Algorithms Week - 10 Write a C program to simulate page replacement algorithms (a) LFU Process Synchronization Week - 12 a) *Write a C program to simulate page replacement algorithms (a) LFU b) *Write a C program to simulate the concept of Dining-Philosophers problem. Week - 13 *Write a C program to simulate disk scheduling algorithms a) ECES		Write a C program to simulate the following file organization techniques					
TechniquesWeek - 7Write a C program to simulate the following file organization techniques (c) HierarchicalDeadlock Management TechniquesWeek - 8Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance.Week - 9Write a C program to simulate Bankers algorithm for the purpose of deadlock prevention.Page Replacement AlgorithmsProcess SynchronizationProcess SynchronizationDisk Scheduling AlgorithmsDisk Scheduling AlgorithmsAlgorithmsVeek - 13 Support and the a C program to simulate the concept of Dining-Philosophers problem.Veek - 13 Support algorithmsAlgorithms	File Organization	(a) Single level directory (b) Two level directory					
Write a C program to simulate the following file organization techniques (c) HierarchicalDeadlock Management TechniquesWeek - 8 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance.Page Replacement AlgorithmsWeek - 10 Write a C program to simulate page replacement algorithmsPage Replacement AlgorithmsWeek - 10 Write a C program to simulate page replacement algorithmsProcess SynchronizationWeek - 12 a) *Write a C program to simulate page replacement to simulate page replacement to simulate page replacement to b) *Write a C program to simulate page replacement algorithmsDisk Scheduling AlgorithmsWeek - 13 *Write a C program to simulate disk scheduling algorithmsDisk Scheduling AlgorithmsWeek - 13 *Write a C program to simulate disk scheduling algorithms	Techniques	Week - 7					
(c) Hierarchical Deadlock Management Techniques Week - 8 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance. Week - 9 Write a C program to simulate Bankers algorithm for the purpose of deadlock prevention. Week - 10 Write a C program to simulate page replacement algorithms (a) FIFO (b) LRU Week - 11 Write a C program to simulate page replacement algorithms (a) LFU *(b) Optimal Week - 12 a) *Write a C program to simulate producer-consumer problem using semaphores. b) *Write a C program to simulate the concept of Dining-Philosophers problem. Week - 13 *Write a C program to simulate disk scheduling algorithms a) FCFS b) SCAN		Write a C program to simulate the following file organization techniques					
Deadlock Management TechniquesWeek - 8 Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance.Week - 9 Write a C program to simulate Bankers algorithm for the purpose of deadlock prevention.Page Replacement AlgorithmsWeek - 10 Write a C program to simulate page replacement algorithms (a) FIFO (b) LRUProcess SynchronizationWeek - 12 a) *Write a C program to simulate page replacement algorithms (a) LFU *(b) OptimalDisk Scheduling AlgorithmsWeek - 13 *Write a C program to simulate disk scheduling algorithms a) ECES		(c) Hierarchical					
Deadlock Management TechniquesWrite a C program to simulate Bankers algorithm for the purpose of deadlock avoidance.Week - 9 Write a C program to simulate Bankers algorithm for the purpose of deadlock prevention.Page Replacement AlgorithmsWeek - 10 Write a C program to simulate page replacement algorithmsWeek - 10 Write a C program to simulate page replacement algorithmsPage Replacement AlgorithmsWeek - 10 Write a C program to simulate page replacement algorithms (a) LFU *(b) OptimalProcess SynchronizationWeek - 11 Write a C program to simulate page replacement algorithms (a) LFU *(b) OptimalDisk Scheduling AlgorithmsWeek - 12 Write a C program to simulate the concept of Dining-Philosophers problem.Week - 13 *Write a C program to simulate disk scheduling algorithms a) ECESWeek - 13 CAN		Week - 8					
Management Techniquesavoidance.Week - 9 Write a C program to simulate Bankers algorithm for the purpose of deadlock prevention.Page Replacement AlgorithmsWeek - 10 Write a C program to simulate page replacement algorithms (a) FIFO (b) LRUWeek - 11 Write a C program to simulate page replacement algorithms (a) LFU *(b) OptimalProcess SynchronizationWeek - 12 a) *Write a C program to simulate producer-consumer problem using semaphores. b) *Write a C program to simulate the concept of Dining-Philosophers problem.Disk Scheduling AlgorithmsWeek - 13 *Write a C program to simulate disk scheduling algorithms a) ECES	Deadlock	Write a C program to simulate Bankers algorithm for the purpose of deadlock					
WethingWeek - 9TechniquesWrite a C program to simulate Bankers algorithm for the purpose of deadlock prevention.Page Replacement AlgorithmsWeek - 10 Write a C program to simulate page replacement algorithms (a) FIFO (b) LRUWeek - 11 Write a C program to simulate page replacement algorithms (a) LFU *(b) OptimalProcess SynchronizationWeek - 12 a) *Write a C program to simulate producer-consumer problem using semaphores. b) *Write a C program to simulate the concept of Dining-Philosophers problem.Disk Scheduling AlgorithmsWeek - 13 *Write a C program to simulate disk scheduling algorithms a) ECES	Management	avoidance.					
Page Replacement Write a C program to simulate Bankers algorithm for the purpose of deadlock prevention. Page Replacement Week - 10 Algorithms Write a C program to simulate page replacement algorithms (a) FIFO (b) LRU Week - 11 Write a C program to simulate page replacement algorithms (a) LFU *(b) Optimal Week - 12 a) *Write a C program to simulate producer-consumer problem using semaphores. b) *Write a C program to simulate the concept of Dining-Philosophers problem. Week - 13 *Write a C program to simulate disk scheduling algorithms a) ECES	Techniques	Week - 9					
Page Replacement Week - 10 Algorithms Write a C program to simulate page replacement algorithms (a) FIFO (b) LRU Week - 11 Write a C program to simulate page replacement algorithms (a) LFU *(b) Optimal Process Week - 12 a) *Write a C program to simulate producer-consumer problem using semaphores. b) *Write a C program to simulate the concept of Dining-Philosophers problem. Disk Scheduling Algorithms Week - 13 *Write a C program to simulate disk scheduling algorithms a) ECES b) SCAN	reeninques	Write a C program to simulate Bankers algorithm for the purpose of deadlock					
Page Replacement AlgorithmsWeek - 10 Write a C program to simulate page replacement algorithms (a) FIFO (b) LRUWeek - 11 Write a C program to simulate page replacement algorithms (a) LFU *(b) OptimalProcess SynchronizationWeek - 12 a) *Write a C program to simulate producer-consumer problem using semaphores. b) *Write a C program to simulate the concept of Dining-Philosophers problem.Disk Scheduling AlgorithmsWeek - 13 *Write a C program to simulate disk scheduling algorithms a) ECES		prevention.					
Page Replacement AlgorithmsWrite a C program to simulate page replacement algorithmsAlgorithmsWeek - 11 Write a C program to simulate page replacement algorithms (a) LFU *(b) OptimalProcess SynchronizationWeek - 12 a) *Write a C program to simulate producer-consumer problem using semaphores. b) *Write a C program to simulate the concept of Dining-Philosophers problem.Disk Scheduling AlgorithmsWeek - 13 *Write a C program to simulate disk scheduling algorithms a) ECES		Week - 10					
Page Replacement Algorithms (a) FIFO (b) LRU Week - 11 Write a C program to simulate page replacement algorithms (a) LFU *(b) Optimal Process (a) Week - 12 (a) *Write a C program to simulate producer-consumer problem using semaphores. (b) *Write a C program to simulate the concept of Dining-Philosophers problem. Disk Scheduling Algorithms Week - 13 *Write a C program to simulate disk scheduling algorithms a) ECES		Write a C program to simulate page replacement algorithms					
Algorithms Week - 11 Write a C program to simulate page replacement algorithms (a) LFU *(b) Optimal Process Week - 12 a) *Write a C program to simulate producer-consumer problem using semaphores. b) *Write a C program to simulate the concept of Dining-Philosophers problem. Week - 13 Write a C program to simulate disk scheduling algorithms a) FCFS b) SCAN	Page Replacement	(a) FIFO (b) LRU					
Write a C program to simulate page replacement algorithms (a) LFU *(b) Optimal Process Synchronization Disk Scheduling Algorithms Week - 13 *Write a C program to simulate the concept of Dining-Philosophers problem. Week - 13 *Write a C program to simulate disk scheduling algorithms a) FCFS b) SCAN	Algorithms	Week - II					
(a) LFU *(b) Optimal (b) CPU *(b) Optimal Week - 12 a) *Write a C program to simulate producer-consumer problem using semaphores. b) *Write a C program to simulate the concept of Dining-Philosophers problem. Disk Scheduling Algorithms Algorithms		Write a C program to simulate page replacement algorithms					
Process a) *Write a C program to simulate producer-consumer problem using semaphores. Synchronization b) *Write a C program to simulate the concept of Dining-Philosophers problem. Disk Scheduling Algorithms Week - 13 *Write a C program to simulate disk scheduling algorithms a) ECES a) *CES b) SCAN							
Process a) * write a C program to simulate producer-consumer problem using semaphores. Synchronization b) *Write a C program to simulate the concept of Dining-Philosophers problem. Disk Scheduling Algorithms Week - 13 *Write a C program to simulate disk scheduling algorithms a) FCFS b) SCAN	D	Week - 12					
Synchronization semaphores. b) *Write a C program to simulate the concept of Dining-Philosophers problem. Disk Scheduling Algorithms Week - 13 *Write a C program to simulate disk scheduling algorithms a) ECES b) SCAN	Process	a) * while a C program to simulate producer-consumer problem using					
Disk Scheduling Algorithms Week - 13 *Write a C program to simulate disk scheduling algorithms a) ECES b) SCAN	Synchromzation	semaphores.					
Disk Scheduling Algorithms Week - 15 *Write a C program to simulate disk scheduling algorithms a) ECES b) SCAN		b) * write a C program to simulate the concept of Dining-Philosophers problem.					
Algorithms (a) ECES (b) SCAN (c) C-SCAN	Disk Scheduling	*Write a C program to simulate disk scheduling algorithms					
	Algorithms	white a C program to simulate disk scheduling algorithms a) ECES b) SCAN a) C SCAN					

*Content beyond the university prescribed syllabi

Prepared by	:	Ms. G Sunitha, Associate Professor, CSE
Date	:	6 June, 2015

HOD, CSE