OPERATING SYSTEMS

LABORATORY MANUAL

(R2021056)

II/IV B.Tech, Semester-I

Academic Year: 2023-24

DEPARTMENT OF INFORMATION TECHNOLOGY

SIR C R REDDY COLLEGE OF ENGINEERING

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(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)

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DEPARTMENT OF INFORMATION TECHNOLOGY

VISION OF THE DEPARTMENT

To be a premier Department in the region in the field of Information Technology through academic excellence and research that enable graduates to meet the challenges of industry and society

MISSIONOF THE DEPARTMENT

- To Provide dynamic teaching-learning environment to make the students industry ready and advancement in career;
- To inculcate professional and leadership quality for better employability and entrepreneurship;
- To make high quality professional with moral and ethical values suitable for industry and society

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PROGRAM OUTCOMES (POs)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using the first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/Development of Solutions: Design solutions for complex engineering problems and system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, society, and environmental considerations.

PO4: Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in society and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.

PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Conceptual Skills: Apply core information technology of systems, architecture, information management, programming, networking for development of current technical concepts.

PSO2: Technical Skills: Design and develop software by adapting emerging technologies for the need of IT industry.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1: Solve real world problems through effective professional skills in Information Technology industry and academic research.

PEO2: Analyze and develop applications in Information Technology domain and adapt to changing technology trends with continuous learning.

PEO3: Practice the profession in society with ethical and moral values.

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GENERAL LABORATORY INSTRUCTIONS

1. Students are advised to come to the laboratory at least 5 minutes before (to the starting time), those who come after 5 minutes will not be allowed into the lab.
2. Plan your task properly much before to the commencement, come prepared to the lab with the synopsis / program / experiment details.
3. Student should enter into the laboratory with:
    a. Laboratory observation notes with all the details (Problem statement, Aim, Algorithm, Procedure, Program, Expected Output, etc.,) filled in for the lab session.
    b. Laboratory Record updated up to the last session experiments and other utensils (if any) needed in the lab.
    c. Proper Dress code and Identity card.
4. Sign in the laboratory login register, write the TIME-IN, and occupy the computer system allotted to you by the faculty.
5. Execute your task in the laboratory, and record the results / output in the lab observation note book, and get certified by the concerned faculty.
6. All the students should be polite and cooperative with the laboratory staff, must maintain the discipline and decency in the laboratory.
7. Computer labs are established with sophisticated and high end branded systems, which should be utilized properly.
8. Students / Faculty must keep their mobile phones in SWITCHED OFF mode during the lab sessions.Misuse of the equipment, misbehaviors with the staff and systems etc., will attract severe punishment.

9. Students must take the permission of the faculty in case of any urgency to go out ; if anybody found loitering outside the lab / class without permission during working hours will be treated seriously and punished appropriately.

10. Students should LOG OFF/ SHUT DOWN the computer system before he/she leaves the lab after completing the task (experiment) in all aspects. He/she must ensure the system / seat is kept properly.

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SYLLABUS

List of Experiments:

1) **a)** Study of Unix/Linux general purpose utility command list: man,who,cat, cd, cp, ps, ls, mv, rm,mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout,shutdown.
   b) Study of vi editor
   c) Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system
   d) Study of Unix/Linux file system (tree structure)
   e) Study of .bashrc, /etc/bashrc and Environment variables.
2) Write a C program that makes a copy of a file using standard I/O, and system calls
3) Write a C program to emulate the UNIX ls –l command.
4) Write a C program that illustrates how to execute two commands concurrently with a commandpipe. Ex: - ls –l | sort
5) Simulate the following CPU scheduling algorithms:
   (a) Round Robin (b) SJF (c) FCFS (d) Priority
6) Multiprogramming-Memory management-Implementation of fork (), wait (), exec() and exit (),System calls
7) Simulate the following:
   a) Multiprogramming with a fixed number of tasks (MFT)
   b) Multiprogramming with a variable number of tasks (MVT)
8) Simulate Bankers Algorithm for Dead Lock Avoidance
9) Simulate Bankers Algorithm for Dead Lock Prevention.
10) Simulate the following page replacement algorithms:
    a) FIFO b) LRU c) LFU
11) Simulate the following File allocation strategies

(a) Sequenced (b) Indexed (c) Linked

12) Write a C program that illustrates two processes communicating using shared memory

13) Write a C program to simulate producer and consumer problem using semaphores

14) Write C program to create a thread using pthreads library and let it run its function.

15) Write a C program to illustrate concurrent execution of threads using pthreads library

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COURSE OUTCOMES

CO	OUTCOMES
1	Understand the fundamentals of UNIX commands and System calls.
2	Apply the process synchronization concepts using shared memory, semaphores for the given problem.
3	Apply deadlock avoidance and detection algorithms and various concepts of file systems.
4	Construct various thread concepts, CPU scheduling algorithms, memory management concepts

CO-PO MAPPING

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	-	2	-	-	-	-	-	-	-	-	2	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	1	-	-
CO3	3	-	2	-	-	-	-	-	1	-	-	-	-	-
CO4	2	-	2	-	-	-	-	-	-	-	-	2	-	-
AVG	3	2	2	-	-	-	-	-	1	-	-	1.67	-	-

CO-PO MAPPING JUSTIFICATION

CO1	PO1	3	The knowledge about Linux commands is needed tosolve complex problems
CO1	PO3	2	The knowledge about Linux commands is needed forthe design and development of solutions to complexproblems.
CO1	PO12	2	Recognize the need and be able to know linux commandsare important to keep current regarding new developments in programming.

CO2	PO1	3	The knowledge of synchronization can be applied to solve complex engineering problems.
CO2	PO12	1	The student will become aware of the need for lifelong learning and the continued upgrading of technical knowledge of semaphores.
CO3	PO1	3	The knowledge of deadlock algorithms can be applied to solve complex engineering problems.
CO3	PO3	2	The knowledge of file allocations can besolve complex engineering problems.
CO3	PO9	1	The knowledge of file allocations can be solve complex engineering problems
CO4	PO2	1	The knowledge of various Cpu Scheduling algorithms helps to design solutions to complex problems.
CO4	PO3	2	The knowledge of os concepts help to analyze and design solutions to complex problems.
CO4	PO10	2	The student will become aware of the need for lifelong learning and the continued upgrading of technical knowledge of linear and Non-linear data structures and their applications such as Stack, Queues, trees and graphs..
CO4	PO12	2	The student will become aware of the need for lifelong learning and the continued upgrading of technical knowledge of operating systems concepts.

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3	Write a C program to emulate the UNIX ls –l command.	**CO1**	
4	Write a C program that illustrates how to execute two commands concurrently with a command pipe. Ex: - ls –l | sort	**CO1**	
5	Simulate the following CPU scheduling algorithms: (a) Round Robin (b) SJF (c) FCFS (d)Priority	**CO4**	
6	Multiprogramming-Memory management-Implementation of fork (), wait (), exec() and exit (), System calls	**CO4**	
7	Simulate the following a) Multiprogramming with a fixed number of tasks (MFT) b) Multiprogramming with a variable number of tasks (MVT)	**CO4**	
8	Simulate Bankers Algorithm for Dead Lock Avoidance	**CO3**	
9	Simulate Bankers Algorithm for Dead Lock Prevention.	**CO3**	
10	Simulate the following page replacement algorithms: a) FIFO b) LRU c) LFU	**CO4**	
11	Simulate the following File allocation strategies (a) Sequenced (b) Indexed (c) Linked.	**CO3**	
12	Write a C program that illustrates two processes communicating using shared memory	**CO2**	
13	Write a C program to simulate producer and consumer problem usingsemaphores	**CO2**	
14	Write C program to create a thread using pthreads library and let it run its function.	**CO4**	
15	Write a C program to illustrate concurrent execution of threads using pthreads library.	**CO4**	
	Content Beyond Syllabus		
16	Write a Shell program to check the given number is even or odd	**CO1**	
17	Write a program for your own merror() message function i.e., called when a file manipulation error occurs.	**CO1**	
	Viva questions		