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SEMESTER S4
OPERATING SYSTEMS LAB

Course Code	PCITL408	CIE Marks	50
Teaching Hours/Week (L: T:P: R)	0:0:3:0	ESE Marks	50
Credits	2	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	GXEST204: Programming in C	Course Type	Lab

Course Objectives:

1. Students will be able to perform basic and advanced UNIX commands, system calls, threads and inter process communication essential for operating system functionalities.
2. Students will be able to solve classical synchronization problems using appropriate techniques such as semaphores, threads, and shared memory.
3. Students will be able to understand and implement various memory management schemes, page replacement algorithms, disk scheduling algorithms, and file organization techniques.

Experiment No.	Experiments
1	Familiarization of system calls (fork, exec, getpid, exit, wait, close, stat etc) in operating system and Demonstration of creating partition and installing Operating System (Not for Examination purpose)
2	Implementation of Process and thread (Life cycle of process): (i) Process creation and Termination; (ii) Thread creation and Termination
3	Implement process scheduling algorithms (FCFS, SJF, Round Robin, Priority) and compute average waiting time and average turn-around time.
4	Inter-process communication using pipes, message queues and shared memory.
5	Implement Producer-Consumer Problem and solve the problem using Semaphores
6	Implementation of Dining Philosophers' Problem using threads and semaphores
7	Implementation of banker's algorithm
8	Implement memory management schemes (first fit, best fit and worst fit)
9	Implement page replacement algorithms: FIFO, LRU and Optimal

10	Implementation of Disk Scheduling using FCFS, SCAN, C-SCAN, LOOK, C-LOOK and SSTF algorithm
11	Implement File Organization Technique (Single Level and Multi-Level Directory) and Allocation Strategies (Sequential, Linked and Indexed)
12	Familiarization of Cloud Platforms and Virtualization tools(eg:-VMWare)

Course Assessment Method
(CIE: 50 marks, ESE: 50 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Preparation/Pre-Lab Work experiments, Viva and Timely completion of Lab Reports / Record (Continuous Assessment)	Internal Examination	Total
5	25	20	50

End Semester Examination Marks (ESE):

Procedure/ Preparatory work/Design/ Algorithm	Conduct of experiment/ Execution of work/ troubleshooting/ Programming	Result with valid inference/ Quality of Output	Viva voce	Record	Total
10	15	10	10	5	50

- **Submission of Record:** Students shall be allowed for the end semester examination only upon submitting the duly certified record.
- **Endorsement by External Examiner:** The external examiner shall endorse the record

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Implement process and thread lifecycle management, including creation, termination, and scheduling.	K3
CO2	Implement inter-process communication techniques such as pipes, message queues, and shared memory.	K3
CO3	Solve classical synchronization problems like Producer-Consumer and Dining Philosophers using semaphores and threads.	K3
CO4	Implement memory management and disk scheduling algorithms, and understand file organization and allocation strategies.	K3

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create

CO-PO Mapping Table (Mapping of Course Outcomes to Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	3	2	-	-	-	-	3	3	-	2
CO2	3	-	3	2	-	-	-	-	3	3	-	2
CO3	3	2	3	2	-	-	-	-	3	3	-	2
CO4	3	2	3	2	-	-	-	-	3	3	-	2

Note: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), -: No Correlation

Text Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Operating System Concepts	Abraham Silberschatz, Peter B Galvin, Greg Gagne	John Wiley & Sons	10 th Edition 2021
2	Programming in C	E. Balagurusamy	Mc Graw Hill	8 th Edition 2019

Reference Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Modern Operating Systems	Andrew S Tanenbaum	Pearson	4 th Edition 2016
2	C Primer Plus	Stephen Prata	Pearson	6 th Edition 2020

Video Links (NPTEL, SWAYAM...)	
Link No.	Link ID
1	https://onlinecourses.nptel.ac.in/noc24_cs80/preview
2	https://onlinecourses.nptel.ac.in/noc24_cs123/preview

Continuous Assessment (25 Marks):

1. Preparation and Pre-Lab Work (7 Marks)

- Pre-Lab Assignments: Assessment of pre-lab assignments or quizzes that test understanding of the upcoming experiment.
- Understanding of Theory: Evaluation based on students' preparation and understanding of the theoretical background related to the experiments.

2. Conduct of Experiments (7 Marks)

- Procedure and Execution: Adherence to correct procedures, accurate execution of experiments, and following safety protocols.
- Skill Proficiency: Proficiency in handling equipment, accuracy in observations, and troubleshooting skills during the experiments.
- Teamwork: Collaboration and participation in group experiments.

3. Lab Reports and Record Keeping (6 Marks)

- Quality of Reports: Clarity, completeness and accuracy of lab reports. Proper documentation of experiments, data analysis and conclusions.
- Timely Submission: Adhering to deadlines for submitting lab reports/rough record and maintaining a well-organized fair record.

4. Viva Voce (5 Marks)

- Oral Examination: Ability to explain the experiment, results and underlying principles during a viva voce session.

Final Marks Averaging: The final marks for preparation, conduct of experiments, viva, and record are the average of all the specified experiments in the syllabus.

Evaluation Pattern for End Semester Examination (50 Marks):

1. Procedure/Preliminary Work/Design/Algorithm (10 Marks)

- Procedure Understanding and Description: Clarity in explaining the procedure and understanding each step involved.
- Preliminary Work and Planning: Thoroughness in planning and organizing materials/equipment.

- Algorithm Development: Correctness and efficiency of the algorithm related to the experiment.
- Creativity and logic in algorithm or experimental design.

2. Conduct of Experiment/Execution of Work/Programming (15 Marks)

- Setup and Execution: Proper setup and accurate execution of the experiment or programming task.

3. Result with Valid Inference/Quality of Output (10 Marks)

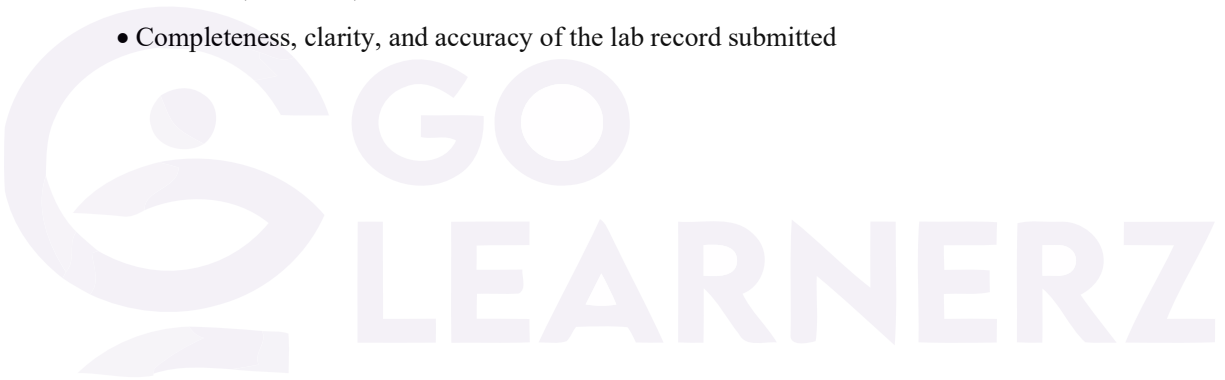
- Accuracy of Results: Precision and correctness of the obtained results.
- Analysis and Interpretation: Validity of inferences drawn from the experiment or quality of program output.

4. Viva Voce (10 Marks)

- Ability to explain the experiment, procedure results and answer related question.
- Proficiency in answering questions related to theoretical and practical aspects of the subject.

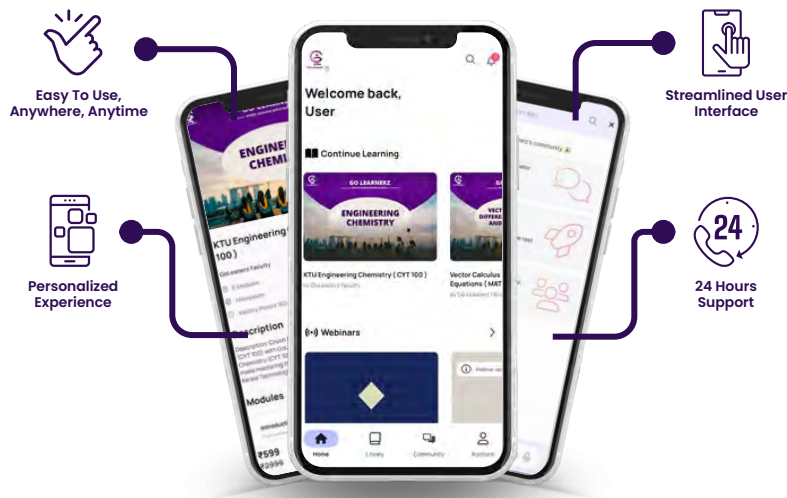
5. Record (5 Marks)

- Completeness, clarity, and accuracy of the lab record submitted





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