# Additional Experiments for B.Tech Labs (JNTUK)

This document lists additional experiments beyond the standard JNTUK syllabus for each subject. Each list contains 5 experiments designed to enhance practical knowledge and skills.

## Computer Networks (CN)

1. Packet Sniffing & Analysis using Wireshark – Capture and analyze packets for different protocols (HTTP, FTP, DNS).
2. Implementing TCP Congestion Control Simulation – Compare Tahoe, Reno, and Cubic algorithms in NS2/NS3.
3. Load Balancing in a Network – Simulate round-robin and weighted load balancing in Mininet.
4. QoS Measurement for VoIP Traffic – Simulate VoIP calls and measure latency, jitter, and packet loss.
5. Firewall Rule Implementation & Testing – Configure iptables to allow/deny specific network traffic.

## Java Programming

1. Multithreaded Chat Application – Client-server communication with multiple concurrent clients.
2. Custom Collection Framework – Implement your own version of ArrayList or HashMap.
3. File Encryption & Decryption – Using Java I/O and cryptography libraries.
4. Image Processing Basics – Apply filters like grayscale, blur, and edge detection using Java AWT.
5. REST API Client in Java – Fetch and display data from a public API using HttpURLConnection.

## Operating Systems (OS)

1. Simulating Memory Fragmentation – Implement first-fit, best-fit, and worst-fit in C.
2. Custom Shell Implementation – Create a basic shell that executes Linux commands.
3. Process Priority Scheduler – Implement a scheduler where process priority changes dynamically.
4. Thread Synchronization Problem – Solve Producer-Consumer using semaphores.
5. File Compression Tool – Implement a simple Huffman encoding-based compression.

## Data Warehousing & Data Mining (DW & DM)

1. Data Cleaning & Preprocessing Pipeline – Handle missing values, outliers, and normalization.
2. Apriori Algorithm Implementation – Generate frequent itemsets and association rules.
3. Data Cube Operations in OLAP – Perform roll-up, drill-down, slice, and dice.
4. Clustering Analysis – Implement K-Means and visualize results.
5. Data Sampling Techniques – Compare random, stratified, and systematic sampling.

## Mathematical & Statistical Techniques (MST)

1. Monte Carlo Simulation – Estimate π or solve probability problems.
2. Curve Fitting & Regression Analysis – Linear and polynomial regression with datasets.
3. Numerical Solution of ODEs – Euler and Runge-Kutta methods.
4. Random Number Generation & Testing – Uniform and normal distribution generators.
5. Hypothesis Testing – t-test, chi-square test for real datasets.

## Machine Learning (ML)

1. Decision Tree Implementation from Scratch – Using Gini index & information gain.
2. Handwritten Digit Recognition – Using MNIST dataset with simple neural networks.
3. Naïve Bayes for Text Classification – Spam email filtering.
4. KNN Algorithm for Image Classification – Using CIFAR-10 subset.
5. Model Evaluation Techniques – Cross-validation, confusion matrix, ROC curve.

## Database Management Systems (DBMS)

1. Stored Procedures & Functions – Create complex business logic in PL/SQL.
2. Database Triggers – Automate tasks like audit logging.
3. Transaction Management Simulation – Commit, rollback, and concurrency control.
4. Database Backup & Restore – Using MySQL dump or PostgreSQL pg\_dump.
5. Full-Text Search Implementation – Search engine-like queries in SQL.

## Unified Modeling Language (UML)

1. UML for E-Commerce Platform – Draw complete diagrams for an online store.
2. Hospital Management System UML – Use case, class, and sequence diagrams.
3. ATM System Modeling – Component and deployment diagrams.
4. Social Media Platform UML – Activity and sequence diagrams for posting & messaging.
5. Library Management UML – Class diagram with relationships & multiplicities.

## Software Engineering (SE)

1. Requirement Specification for a Real Project – Prepare SRS for an app idea.
2. Agile Sprint Backlog Simulation – Use Jira/Trello to plan sprints.
3. Version Control with Git – Branching, merging, conflict resolution.
4. Software Testing Automation – Write Selenium test cases for a web app.
5. Cost Estimation using COCOMO Model – Estimate development effort for given requirements.