## Major Equipment List

- Desktops with following configurations:
  - Processor: **Intel core i7 (6700/4790) @ 3.40 Ghz**
  - RAM: **4 Gb**
  - Operating System: **Windows 10 / pro 8 / 8**.



- Associated Laboratories
  - Database management systems
  - Python programming
  - Data science using Python
  - Novel Engaging Course LABs

In charge:

Dr. Pawan Dubey

Physical In Charge:

Mr. Rajesh Tomar

# Computational Intelligence Lab

**GENERAL PRACTICES TO BE FOLLOWED IN LABORATORY:**

- You are expected to leave your computer workstation in the same condition as you found it.
- You are responsible for reading and abiding by all signs posted in the computer labs.

- Software downloaded from the Internet is not to be installed on any lab computer for any purpose.
- Documents should be saved to your network drive, to a flash drive or to a cloud storage account.
- The computer labs are an academic resource. As such, please respect the needs of others by not monopolizing the computers for non-academic use.

**Do's:**

1. Remove your shoes or wear foot socks before you enter the lab.
2. Always keep quiet. Be considerate to other lab users.
3. Report any problems with the computer to the person in charge.
4. Shut down the computer properly.
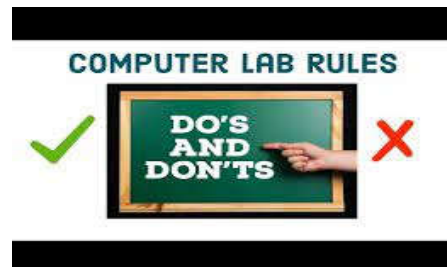


**Don'ts:**
1. Do not bring any food or drinks in the computer room.
2. Do not touch any part of the computer with wet hands.
3. Do not hit the keys on the computer too hard.
4. Don't damage, remove, or disconnect any labels, parts, cables or equipment. Do not install or download any software or modify or delete any system files on any lab computers.

## Department of Information Technology

## Database Management System Lab

## List of Experiments

While creating tables, databases the name should have a prefix of your roll number. Ex. If your roll number is 55 then every table name must start with 55 TABLE_NAME. 1. Write program name 2. Write description of command used for executing the query. 3. Write commands in bold letters. 4. Take the screenshot of the output.

1. Implementation of DDL commands of SQL with suitable examples. a. Create table; b. Alter table; c. Drop Table
2. Implementation of DML commands of SQL with examples. a. Insert; b. Update; and c. Delete
3. Implementation of different type of function with suitable example a. Number function; b. Aggregate function; c. Character function; d. Conversion function; e. Data function
4. Implementation of different type of operators in SQL. a. Arithmetic operators; b. Logical operators; c. Set operator; f. Comparison Operator; g. Special operator.
5. Implementation of type of joins. a. Inner Join; b. Outer Join; and Natural Join etc.
6. Study and implementation of a. Group by & having clause; b. order By clause; c. Indexing.
7. Study of Implementation of a. Sub queries; b. Views;
8. Study & implementation of different type of constraints.
9. Study & implementation of database backup & recovery command.
10. Study & implementation of Rollback, commit, save point.

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## Course outcomes
CO1. construct database schema for a given problem domain.
CO2. apply integrity constraints on a database schema using a state-of-the-art RDBMS.
CO3. apply SQL queries using DDL and DML to design and access database systems.
CO4. make use of operators and functions used in query.
CO5. distinguish Tables and Views for database systems.
CO6. develop a small project for a real-world scenario.

# Department of Information Technology

## Database Management System Lab

## Skill Based Mini Projects

**Mini Skill Project 1**

Consider the following schema for a Library Database:
BOOK ( Book_id, Title, Publisher_Name, Pub_Year)
BOOK_AUTHORS (Book_id, Author_Name)
PUBLISHER (Name, Address, Phone)
BOOK_COPIES (Book_id, Programme_id, No-of_Copies)
BOOK_LENDING (Book_id, Programme_id, Card_No, Date_Out, Due_Date)
LIBRARY_PROGRAMME (Programme_id, Programme_Name, Address)

**Write SQL queries to**

1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc.
2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.
3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
5. Create a view of all books and its number of copies that are currently available in the Library.

**Mini Skill Project 2**

Consider the following schema for Order Database:

SALESMAN (Salesman_id, Name, City, Commission)

CUSTOMER (Customer_id, Cust_Name, City, Grade, Salesman_id)

ORDERS (Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)

**Write SQL queries to**

Count the customers with grades above Bangalore's average.

1. Find the name and numbers of all salesman who had more than one customer.
2. List all the salesman and indicate those who have and do not have customers in their cities (Use UNION operation.
3. Create a view that finds the salesman who has the customer with the highest order of a day.
4. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.

## Mini Skill Project 3

Consider the schema for Movie Database:

ACTOR (Act_id, Act_Name, Act_Gender)
DIRECTOR (Dir_id, Dir_Name, Dir_Phone)
MOVIES (Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)
MOVIE_CAST (Act_id, Mov_id, Role)
RATING (Mov_id, Rev_Stars)

### Write SQL queries to

1. List the titles of all movies directed by 'Hitchcock'.
2. Find the movie names where one or more actors acted in two or more movies.
3. List all actors who acted in a movie before 2000 and in a movie after 2015 (use JOIN operation).
4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.
5. Update rating of all movies directed by 'Steven Spielberg' to 5.

## Mini Skill Project 4

Consider the schema for College Database:

STUDENT (USN, SName, Address, Phone, Gender)
SEMSEC (SSID, Sem, Sec)
CLASS (USN, SSID)
COURSE (Subcode, Title, Sem, Credits)
IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)

### Write SQL queries to

1. List all the student details studying in fourth semester 'C' section.
2. Compute the total number of male and female students in each semester an section.
3. Create a view of Test1 marks of student USN '1BI15CS101' in all Course
4. Calculate the FinalIA (average of best two test marks) and update the corre table for all students.
5. Categorize students based on the following criterion:
   a. If FinalIA = 17 to 20 then CAT = 'Outstanding'
   b. If FinalIA = 12 to 16 then CAT = 'Average'
   c. If FinalIA< 12 then CAT = 'Weak'
6. Give these details only for 8th semester A, B, and C section students.

**Mini Skill Project 5**

Consider the schema for Company Database:

EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)

DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)

DLOCATION (DNo,DLoc)

PROJECT (PNo, PName, PLocation, DNo)

WORKS_ON (SSN, PNo, Hours)

**Write SQL queries to**

1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.
2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.
3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).
5. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.

**Mini Skill Project 6**

A university registrar's office maintains data about the following entities:

a) courses, including number, title, credits, syllabus, and prerequisites;
b) (b) course offerings, including course number, year, semester, section number,
c) instructor(s), timings, and classroom;
d) (c) students, including student-id, name, and program; and
e) (d) instructors, including identification number, name, department, and title. Further,
f) the enrollment of students in courses and grades awarded to students in each course
g) they are enrolled for must be appropriately modeled.

Construct an E-R diagram for the registrar's office. Document all assumptions that you make about the mapping constraints.

**Mini Skill Project 7**

Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.

**Mini Skill Project 8**

Construct an E-R diagram for a hospital with a set of patients and a set of medical doctors. Associate with each patient a log of the various tests and examinations conducted.

**Mini Skill Project 9**

Design an E-R diagram for keeping track of the exploits of your favorite sports team. You should store the matches played, the scores in each match, the players in each match and individual player statistics for each match. Summary statistics should be modeled as derived attributes.

**Mini Skill Project 10**

Consider a database used to record the marks that students get in different exams of different course offerings.

      a. Construct an E-R diagram that models exams as entities, and uses a ternary

      relationship, for the above database.

      b. Construct an alternative E-R diagram that uses only a binary relationship between

      students and course-offerings.

Make sure that only one relationship exists between a particular student and course-offering

pair, yet you can represent the marks that a student gets in different exams of a course

offering.

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## Data science using Python

## List of Experiments

1. Write a python program to compute
   a. Central Tendency Measures: Mean, Median, Mode
   b. Measure of Dispersion: Variance, Standard Deviation
2. Study of Python Basic Libraries such as Statistics, Math, Numpy and Scipy
3. Study of Python Libraries for data science such as Pandas and Matplotlib
4. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
5. Write a Python program to implement Simple Linear Regression
6. Implementation of Multiple Linear Regression for House Price Prediction using sklearn.
7. Implementation of Decision tree using sklearn and its parameter tuning
8. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
9. Write a program to implement the naïve Bayesian classifier for a sample training dataset stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
10. Implementation of KNN using sklearn

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Course outcomes:

CO1.  develop relevant programming abilities.

CO2.  demonstrate proficiency with statistical analysis of data.

CO3.  develop the ability to build and assess data-based models.

CO4.  execute statistical analyses with professional statistical software.

CO5.  demonstrate skill in data management.

Data science using Python

## List of Skill Based Mini Project

1.  Movie Recommendation System- A recommendation system sends out suggestions to users through a filtering process based on other users' preferences and browsing history. If A and B like Home lone and B likes Avengers, it can be suggested to A. Dataset: MovieLens dataset.

2.  Customer Segmentation- Identify segments of customers to target the potential user base using clustering (i.e. K-means clustering). Divide customers into groups according to common characteristics like gender, age, interests and spending habits. Dataset: Mall_Customers dataset.

3.  Fake News Detection- ake news is sometimes transmitted through the internet by some unauthorised sources, which creates issues for the targeted person and it makes them panic and leads to even violence. Dataset: fake-news kaggle.

4.  Cab Pickups Analysis- cab pickup and distribution, time, days when pickup happens regularly, Dataset: Uber-Pickups dataset.

5.  Price Recommendation for Online Sellers.

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## Python Programming Lab

### List of Experiments

1. Write a program to demonstrate different number data types in python.
2. Write a program to perform different arithmetic operations on numbers in python.
3. Write a program to create, concatenate and print a string and accessing substring from given string.
4. Write a python program to create, append and remove lists in python.
5. Write a program to demonstrate working with tuples in python.
6. Write a program to demonstrate working with dictionaries in python.
7. Write a python program to find the factorial of a number using recursion.
8. WAP to swap two integers without using a third variable. The swapping must be done in a different method in a different class.
9. WAP to read content of a file and write into another file.
10. Write a python program to define a module and import a specific function in that module to another program.

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## Course outcomes

CO1. write, test, and debug simple Python programs.

CO2. solve computational problem using python language.

CO3. familiar with basics syntax and features of python programming language.

CO4. use Python lists, tuples, dictionaries for representing compound data.

CO5. design a program utilizing the features of object-oriented concept.

CO6. utilize some of the libraries available for solving problems

# Department of Information Technology

Python Programming Lab

## List of skill based mini project

1. Implement a calculator using Tkinter library.
2. Design and implementation of Animal Kingdom Classification.
3.  Design and implementation of Currency Converter.
4. Design and implementation of Snake Game in Java.
5. Design and implementation of a real-time, User-friendly Currency Converter.
6. Design and implementation of a File Manager which supports various types of files.
7. Design a program for Number Guessing using random number generator library. Make a play game with the defined library.
8. Design any game of your choice like tic-tac-toe etc.
9. Implement a contact book (command line project) capable of storing user data like name, address, phone number, email etc. Use any database for storing the information so that updation and deletion can also be carried out.
10. Implement binary search algorithm by creating a list from random numbers between any predefined ranges.
11. Design a program for spam filtering.
12. Design a dice rolling simulator generating random number from 1 to 6 every time dice is rolled.
13. Implement countdown clock and timer.

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## Design and Analysis of Algorithm

### List of Experiments

1. WAP to implement the following using array as data structure and analyze its time complexity.
   a. Insertion sort b. Selection sort c. Bubble sort d. Quick sort e. Merge sort

   f. Bucket sort g. Heap sort

2. WAP to implement Linear and Binary Search and analyze its time complexity.
3. WAP to implement Strassen's Matrix Multiplication.
4. WAP to implement Matrix Chain Multiplication and analyze its time complexity.
5. WAP to implement Longest Common Subsequence Problem and analyze its time complexity.
6. WAP to implement Optimal Binary Search Tree Problem and analyze its time complexity.
7. WAP to implement 0/1 knapsack using dynamic programming.
8. WAP to implement Dijkstra's Algorithm and analyze its time complexity.
9. WAP to implement Bellman Ford Algorithm and analyze its time complexity.
10. WAP to implement DFS and BFS and analyze their time complexities.

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## Course outcomes

CO1. relate the principles of algorithm design in solving problems.

CO2. demonstrate basic algorithms and different problem-solving strategies.

CO3. build creativeness and confidence to solve non-conventional problems.

CO4. analyze running times of algorithms using asymptotic analysis.

CO5. compare various algorithm design approaches for solving real world problems.

CO6. design and implement optimization algorithms in specific applications.

## Design & Analysis of Algorithms

### List of Skill Based Mini Project

1. Implement tree traversal techniques like pre-order, post-order and in-order.
2. Implementation of divide and conquer based merge sort algorithm, quick sort algorithm.
3. Implementation of divide and conquer based matrix multiplication algorithm.
4. Implement the greedy approach for single source shortest path.
5. Design a program for finding minimum cost tree for traversing all nodes of a graph.
6. Implement the Knapsack problem and 0/1 Knapsack problem.
7. Implement the travelling salesman problem using dynamic programming.
8. Implement matrix chain multiplication using dynamic programming.
9. Design a program for 4 and 8 queen problem.
10. Implement a program for polynomial reduction.
11. Implement a phone directory application using doubly-linked lists.
12. Implement the movement of knight in chess game.