Faculty of Computer Science
Lab Manual

Course Code: CCBCA521
Course Name: AI LAB
Credits: 2 | **Periods/Week:** 4 | **Type:** Core Practical
Marks: Mid-Term – 30 | End Semester – 70 | Total – 100

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Designation
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Student Guidelines –

Preparation Before Lab

- Revise the basic syntax (variables, loops, functions, data structures).
- Read the aim and procedure of the experiment before coming to the lab.
- Bring your lab manual and required notes.

1. **During Lab Sessions**
   - Write clean, well-indented, and properly commented code.
   - Use meaningful variable and function names.
2. **Submission & Documentation**
   - Each experiment must include: Aim, Code, Sample Output.
   - Upload code files and notebooks to GitHub (if required by faculty).
   - Ensure the code runs without errors before submission.
   - Plagiarism or copy-pasting code from others will lead to rejection.
3. **Project Work**
   - Select dataset/project topic in consultation with faculty.
   - Submit both project report (PDF/DOCX).
4. **Good Practices**
   - Comment your code to explain logic, not just syntax.
   - Use Git for version control and collaborative work.
   - Test your code with different inputs/datasets.
5. **Conduct in Lab**
   - Handle lab equipment responsibly.
   - Do not install unauthorized software/packages.
   - Save your work before leaving the lab.
   - Respect deadlines for submissions.

Course Learning Objectives (CLOs)

- **CLO1:** Explain the basic data types of Python
- **CLO2:** Understand the Data structure used to implement AI problems.
- **CLO3:** Evaluation of AI models.
- **CLO4:** Understanding of Natural Language Processing.
- **CLO5:** Analysing various AI Problems.

Course Outcomes (COs)

- **CO1:** Use sequence data types (List, Dictionary and Set) to write basic Python programming.
- **CO2:** To implement Data structure concepts in Python.
- **CO3:** To Evaluate the AI models pre-processed through various algorithms by Python Programming.
- **CO4:** To Develop the code for the recommender system using Natural Language processing.
- **CO5:** To Design various algorithms to solve various AI problems.

Software & Installation

- Open your web browser and navigate to the official Python website: python.org/downloads.
- Locate the latest stable Python 3 release for Windows (e.g., Python 3.x.x).
- Click on the appropriate Windows installer link for your system (e.g., "Windows installer (64-bit)" or "Windows installer (32-bit)"). This will download an executable (.exe) file.
- Once the download is complete, locate the downloaded .exe file and double-click it to launch the Python installer.
- Now follow the steps of Python installer

Preliminary - Syntax (Prerequisites) – for advanced labs

- Print statements, comments, indentation.
- Variables & data types (int, float, string, bool).
- Arithmetic, relational & logical operators.
- Input & output (input(), print() formatting).
- Conditional statements (if, if-elif-else).
- Loops (for, while, break, continue).
- Functions (definition, arguments, return values).

List of Experiments

Understanding Python basics for implementing AI problems (CO1)

1. Perform various operations on List.
2. Perform various operations on Dictionary.
3. Perform various operations on Set.

Understanding various Data structures used for AI problems (CO2)

4. Implementation various operations on Stack.
5. Implementation various operations on Queue.

Solving Basic AI Problems (CO2, CO3)

6. Create utility to convert upper case in lower case and vice versa.
7. Create a utiliy for Encryption and Decryption (Caesar Cipher method)
8. Perform Breadth First Search Algorithm.
9. Perform Depth First Search Algorithm.
10. find minimum distance tour when starting city and ending city is given.

Solving Advance AI problems and using NLP (CO4, CO5)

11. remove stop words for a given passage from a file using NLTK.
12. stemming for a given sentence using NLTK.
13. POS (Parts of Speech) tagging for the given sentence using NLTK.
14. Solving standard Water Jug Problem.

Mini Project Examples (CO5)

- **Project 1:** Game development.
- **Project 2:**. Chatbot Application.
- **Project 3:**.Expert System development.

Project Report Submission Guidelines

Each student/team must complete one mini project at the end of the semester, demonstrating an end-to-end data science workflow (data acquisition → cleaning → transformation → visualization → insights).

1. Project Report Structure

The report should be organized as follows:

1. **Title Page**
   - Project Title
   - Student Name(s) & Roll Number(s)
   - Course Code & Course Name
   - Faculty Guide Name
   - Semester/Year
2. **Abstract (200–250 words)**
   - Brief summary of the problem, dataset, and results.
3. **Introduction**
   - Background & motivation
   - Problem statement
   - Objectives of the project
4. **Methodology**
   - Data cleaning steps (missing values, outliers)
   - Feature transformation (encoding, scaling, PCA if applied)
   - Visualization techniques (Matplotlib/Seaborn plots)
   - Any tools/libraries used (Pandas, Scikit-learn, etc.)
5. **Results & Analysis**
   - Graphs, plots, and tables with interpretation
   - Insights drawn from the analysis
6. **Conclusion & Future Scope**
   - Summary of findings
   - Possible improvements or extensions
7. **References**
   - Dataset sources, research papers, articles, or websites consulted
8. **Appendix**
   - GitHub Repository Link (mandatory)
   - Screenshots of outputs (if required)

2. GitHub Submission Workflow

- Each project must be hosted on **GitHub repository**.

Viva Sample Question

- How do you implement a stack in Python using a list?
- Give one real-life example of stack usage.
- What are enqueue and dequeue operations?
- Is Python string mutable or immutable? Why?
- What is Caesar Cipher encryption?
- What is the time complexity of BFS?
- Give real-life application of BFS.
- What is backtracking in DFS?
- Which data structure is used in DFS?
- Why do we remove stop words in NLP?
- What is stemming?
- Which stemmers are available in NLTK?
- Why is POS tagging important in NLP?
- What is the Water Jug Problem in AI?
- What is a state in the Water Jug Problem?