

## **Programming Fundamentals – Final Project Instructions(B16)**

### **Instructions:**

- You must submit CPP files of the program in a folder, named your Registration Number.
- You must upload your lab tasks on CMS.
- All program codes should be written in C/C++. Students should use Visual Studio compiler for coding.
- Indent and comment your code.
- Use meaningful variable names.
- Plan your code carefully on a piece of paper before you implement it.
- FOR ALL OF THE FOLLOWING PROJECTS, THE STUDENTS WILL NEED TO LEARN FROM CHATGPT AND INTERNET.

### **Learning Objectives:**

- Demonstrate knowledge of basic arrays in programming C++. (Revision)

### **CLO Table:**

| CLO No | CLO Statement   | Bloom's Taxonomy Level | PLO |
|--------|---|------------------------|-----|
| 1      | Create solutions for real-world issues while staying within restrictions and making the most use of available resources by utilizing sophisticated problem-solving methods. | P3                     | 5   |

### **Project Presentation**

#### **Objective:**

- Arrays (Integer, Character, C-String)
- Functions
- File Handling
- Pointers

- 2D Arrays
- Parallel Arrays
- Dynamic Memory Allocation (DMA)

## **Instruction :**

Please add the following instructions:

They may use getline but Cstring Library is not allowed

- I. Use of string is zero marks
- II. Use of ChatGPT is Allowed but for understanding and any copy is still zero marks
- III. Must use maximum number of functions, more functions more marks
- IV. Code must compile and run
- V. Must Use Visual Studio 2019 or latest

Students should submit project in 2 phases:

- ***First Phase:*** (use comments in .cpp file)
  - Description of problem break down and logic/algorithm
  - Function prototypes and description of what each function do, its parameters, justification for passing by-value or by-reference
  - Description of Files Structure and example files
  - code of main function that uses the functions prototypes
  - Skeleton code of all functions
  - The main function must compile and run with the prototypes and
  - skeleton code of functions

### **Second Phase:**

- complete code of each function
- compile and run
- submit screenshots of successful runs
- submit all files that are used

## **Group and Presentation Rules:**

- Each group can have a maximum of 4 members.
- During the presentation, every group member must explain the part of the project they worked on.

## **Submission Details:**

- Part 1 : Documentation (Flowchart, function prototypes, problem definition, explanation of approach)
- Part 2 : Coding (All functionality implemented using required concepts)
- Viva : Oral questions on logic and code

**Documentation Requirements:**

- Project title, Group information (name and reg number) and abstract.
- Flow chart
- Function prototypes and descriptions.
- Explanation of file structure and format.
- Screenshots of outputs and testing.

**Projects List:**

**FOR ALL OF THE FOLLOWING PROJECTS, THE STUDENTS WILL NEED TO LEARN FROM CHATGPT AND INTERNET**

### **Project One: Recommender System**

A Match Maker Portal contains data of potential marriage partner requirements from parents or persons. You will provide program to for a Match between male and female Candidates and generate the most suitable

Female partners for each male candidate and most suitable male candidates for each female candidate.

**For this problem you will need to do the following:**

- 1. Decide the format of the file containing the marriage partner descriptions and requirements**
- 2. Create at least 20 requirements descriptions for male and 20 for female.**
- 3. Devise and Code the matching algorithm**
- 4. Run code and test against some manual results**
- 5. Provide an analysis of the performance e.g. Accuracy etc. of your method**

### **Project Two: Data Analysis Engine**

A text file "stock\_list.txt" contains the paths of one or more .CSV files, each containing Stock Prices of one stock. You will first read each path from "stock\_list.txt" and then read the Stock prices from the path, each CSV file has the data in the following fields:

**Date,Open,High,Low,Close,Adj Close,Volume**

**Categorize the Stocks according to their similarity in these fields: Open,High,Low,Close,Volume. Your method must use all the data provided in the files. (you will need to get help from internet or**

**Chatgpt on how to compare data for similarity)**

### **Project Three: Auto Code Grader**

A text file "cpp\_file\_paths.txt" contains list of code files paths and paths of corresponding reference outputs.

This program will, first, read each path from "cpp\_file\_paths.txt", compile, run (from the path) the code file and store the output in text in individual output files. Then the program will compare the output against respective (from path) output reference. The program will grade the code as per the % of lines of 2 output files that match. The grade is written to a file "results.csv" along with the code file path.

### **Project Four: Data Analyzer**

In this project you will develop a Data Analysis program that reads data from two or more CSV files, each contain Stock price data ( a file named "stock\_path\_list.txt" contains the list of files to read) in multiple arrays with each array containing one field of data. Each CSV file contains data in the following format:

**Date, Open, High, Low, Close, Adj Close ,Volume**

Your program will perform the following data analysis tasks:

- 1. Do an ANOVA (read the details from internet or find from ChatGPT) analysis of each filed of the data, display the results on screen and write to a file "anova.txt"**
- 2. Calculate Principal Components for each field (other than date) of each stock, display the PCA values and write to a file "pca.csv". You will need to decide the format of the "pca.csv" file as this file will contain the stock name, data field and then Principal Components**
- 3. Calculate Fast Fourier Transform (FFT) of each field (other than date) of each stock, display the Top 5 frequencies and write to a file "fft.csv". You will need to decide the format of the "fft.csv" file as this file will contain the stock name, data field and then 5 top frequencies**
- 4. Calculate Fast Fourier Transform (FFT) (get info and algorithm**

rom internet or ChatGPT) of each field (other than date) of each stock, display the Top 5 frequencies and write to a file "fft.csv". You will need to decide the format of the "fft.csv" file as this file will contain the stock name, data field and then 5 top frequencies

**5. Calculate Fast Wavelet Transform (WT)** (get info and algorithm from internet or ChatGPT) of each field (other than date) of each stock, display the 2 TOP frequencies of each frequency BAND and write to a file "wt.csv". You will need to decide the format of the "wt.csv" file as this file will contain the stock name, data field and then 2 TOP frequencies of each frequency BAND

**6. (bonus for brave at heart coders)** Do a multivariate-Regression of the Actual Stocks "close" Prices and forecast future "close" prices of all the stocks and write to a file "forecast.csv". Next do the multivariate-Regression of the Stocks "close" Prices in frequency domain (after the FFT) and write the forecast of future "close" prices (in frequency domain) of all the stocks and write to a file "fft\_forecast.csv". Lastly, do the same for WT Data as for FFT and write to a file "wt\_forecast.csv". In each of multivariate-Regression, you will need to calculate the accuracy of the forecast and compare the accuracies of the forecasts in 3 different domains data: Actual, FFT, WT

#### **Project Five: Animation (for the Brave at Heart and Passion to Learn)**

This project requires some learning curve about using Graphics in C++. Your task is to use the provided Graphic Library (and some code examples) to Create an animated Game, where the player will move various object through various obstacles by using linear transformation

#### **Objects:**

- a) Table: height H meters, length L meters and width: W meters
- b) Sofa: height of back: H meters, height of Side Support: S meter; length L meters and width: W meters
- c) Irregular Shape (see diagram below)

**Obstacles:**

- a) Corridor of height CH meters, length CL meters and width: CW meters**
- b) Stairs Corner: (See diagram below)**
- c) Door: length DL meters and width: DW meters**
- d) Connecting Corridors: First Corridor is as a) and second Corridor: height CH2 meters, length CL2 meters and width: CW2 meters**