

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING		CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---	---



LAB MANUAL

Subject: **C Programming Lab**

Sub code: **1BPOPL107/207**

Prepared By: **Mr. Aneel Narayanapur**

Course outcome

CO1: Develop programs in C to solve simple computational problems.

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---

CO2: Make use of C language derived data types to solve simple real-world problems.

CO3: Build a document consisting of experiment setup, design, implementation and results with inferences.

PART A

CONVENTIONAL EXPERIMENTS

Program1. A robot needs to find how far it must travel between two points on a 2D plane. Develop a C program to calculate the straight-line distance between the given coordinates.

```
//distance=pow(2,sqrt(x2-x1))+(pow(2,y2-y1))

#include <stdio.h>

#include <math.h>

int main() {

    double x1, y1, x2, y2, distance;

        // Input coordinates of point 1

    printf("Enter coordinates of point 1 (x1 y1): ");

    scanf("%lf %lf", &x1, &y1);

    // Input coordinates of point 2

    printf("Enter coordinates of point 2 (x2 y2): ");

    scanf("%lf %lf", &x2, &y2);

    // Calculate distance

    distance = sqrt((x2 - x1) * (x2 - x1) + (y2 - y1) * (y2 - y1));

    // Display result

    printf("The straight-line distance between the points is: %.4lf\n", distance);
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING		CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---	---

return 0;

}

OUTPUT:

Enter coordinates of point 1 (x1 y1): 2 3

Enter coordinates of point 2 (x2 y2): 7 8

The straight-line distance between the points is: 7.0711

Program 2.Develop a C program that takes a student's marks as input and displays their grade based on the following criteria:

90 and above: Grade A

75 to 89: Grade B

60 to 74: Grade C

50 to 59: Grade D

Below 50: Grade F

Choose a suitable control structure to implement this logic efficiently.

```
#include <stdio.h>
```

```
int main() {
```

```
    int marks;
```

```
    char grade;
```

```
    printf("Enter the student's marks (0-100): ");
```

```
    scanf("%d", &marks);
```

```
    if (marks < 0 || marks > 100) {
```

```
        printf("Invalid marks entered.\n");
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING		CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---	---

```

        return 1; // Exit for invalid input
    }
    if (marks >= 90) {
        grade = 'A';
    } else if (marks >= 75) {
        grade = 'B';
    } else if (marks >= 60) {
        grade = 'C';
    } else if (marks >= 50) {
        grade = 'D';
    } else {
        grade = 'F';
    }
    printf("Grade: %c\n", grade);
    return 0;
}

```

OUTPUT:

Enter the student's marks (0-100): 82

Grade: B

Program3. Develop a C program that takes a unique identification input like PAN Number, AADHAR_Number, APAAR_Id, Driving License, Passport and checks it against

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING		CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---	---

a set of stored KYC records. Based on the input, display whether the individual is verified or not. Use an appropriate control structure to handle multiple possible ID matches. Assume all Unique identification are of integer type.

- Stores a few KYC records with different types of IDs (all as integers).
- Accepts an ID input from the user.
- Checks if the input matches **any** stored ID.
- Uses a switch statement or if-else ladder to handle different ID types.
- Displays whether the individual is verified or not.

Assumptions:

- IDs are stored in separate arrays per ID type.
- User selects the ID type, then enters the ID number.
- The program searches the corresponding stored records.

```
#include <stdio.h>

#define MAX_RECORDS 5

// Function to check if an ID exists in the given array
int isVerified(int idList[], int size, int id) {
    for (int i = 0; i < size; i++) {
        if (idList[i] == id)
            return 1; // Found
    }
    return 0; // Not found
}

int main() {
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

// Stored KYC IDs for each type (sample data)

```
int panNumbers[MAX_RECORDS] = {123456789, 987654321, 112233445, 556677889, 998877665};
```

```
int aadharNumbers[MAX_RECORDS] = {111122223333, 222233334444, 333344445555, 444455556666, 555566667777};
```

```
int apaarIds[MAX_RECORDS] = {10101, 20202, 30303, 40404, 50505};
```

```
int drivingLicenses[MAX_RECORDS] = {789456123, 456123789, 123789456, 987123654, 654987321};
```

```
int passports[MAX_RECORDS] = {555555, 666666, 777777, 888888, 999999};
```

```
int choice;
```

```
long long inputId; // Use long long to accommodate large IDs like Aadhar
```

```
printf("Select ID type to verify:\n");
```

```
printf("1. PAN Number\n");
```

```
printf("2. AADHAR Number\n");
```

```
printf("3. APAAR ID\n");
```

```
printf("4. Driving License\n");
```

```
printf("5. Passport\n");
```

```
printf("Enter your choice (1-5): ");
```

```
scanf("%d", &choice);
```

```
printf("Enter the ID number: ");
```

```
scanf("%lld", &inputId);
```

```
int verified = 0;
```

```
switch (choice) {
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---

case 1:

```
verified = isVerified(panNumbers, MAX_RECORDS, (int)inputId);
```

```
break;
```

case 2:

```
// For Aadhar, casting to int might lose info, so let's compare long long
```

```
{
```

```
    long long aadharNumbersLL[MAX_RECORDS] = {111122223333, 222233334444,  
333344445555, 444455556666, 555566667777};
```

```
    verified = 0;
```

```
    for (int i = 0; i < MAX_RECORDS; i++) {
```

```
        if (aadharNumbersLL[i] == inputId) {
```

```
            verified = 1;
```

```
            break;
```

```
        }
```

```
    }
```

```
}
```

```
break;
```

case 3:

```
verified = isVerified(apaarIds, MAX_RECORDS, (int)inputId);
```

```
break;
```

case 4:

```
verified = isVerified(drivingLicenses, MAX_RECORDS, (int)inputId);
```

```
break;
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---

case 5:

```
verified = isVerified(passports, MAX_RECORDS, (int)inputId);
```

```
break;
```

default:

```
printf("Invalid choice.\n");
```

```
return 1;
```

```
}
```

```
if (verified)
```

```
printf("Individual is verified.\n");
```

```
else
```

```
printf("Individual is NOT verified.\n");
```

```
return 0;
```

```
}
```

OUTPUT:

Select ID type to verify:

1. PAN Number
2. AADHAR Number
3. APAAR ID

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING		CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---	---

4. Driving License

5. Passport

Enter your choice (1-5): 2

Enter the ID number: 333344445555

Individual is verified.

Program4. A math app needs to determine the type of roots for a quadratic equation based on user input. Develop a C program to calculate and display the roots based on the given coefficients.

- Accepts coefficients aaa, bbb, and ccc for a quadratic equation $ax^2+bx+c=$
- Calculates the discriminant.
- Determines the type of roots (real & distinct, real & equal, or complex).
- Displays the roots accordingly.

```
#include <stdio.h>
```

```
int main() {
```

```
    double a, b, c;
```

```
    double discriminant, root1, root2, realPart, imagPart;
```

```
    printf("Enter coefficients a, b and c: ");
```

```
    scanf("%lf %lf %lf", &a, &b, &c);
```

```
    if (a == 0) {
```

```
        printf("Not a quadratic equation.\n");
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

```

return 0;
}

discriminant = b * b - 4 * a * c;

if (discriminant > 0) {
    // Two distinct real roots
    root1 = (-b + sqrt(discriminant)) / (2 * a);
    root2 = (-b - sqrt(discriminant)) / (2 * a);
    printf("Roots are real and distinct:\n");
    printf("Root 1 = %.4lf\n", root1);
    printf("Root 2 = %.4lf\n", root2);
} else if (discriminant == 0) {
    // Two equal real roots
    root1 = -b / (2 * a);
    printf("Roots are real and equal:\n");
    printf("Root = %.4lf\n", root1);
} else {
    // Complex roots
    realPart = -b / (2 * a);
    imagPart = sqrt(-discriminant) / (2 * a);
    printf("Roots are complex and imaginary:\n");

```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

```
printf("Root 1 = %.4lf + %.4lfi\n", realPart, imagPart);
printf("Root 2 = %.4lf - %.4lfi\n", realPart, imagPart);
}
```

```
return 0;
}
```

gcc quadratic.c -o quadratic -lm

OUTPUT:

Enter coefficients a, b and c: 1 -3 2

Roots are real and distinct:

Root 1 = 2.0000

Root 2 = 1.0000

Program5. A sensor in a robotic arm needs to calculate the angle of rotation in real-time, but the hardware doesn't support built-in trigonometric functions. Develop a C program to approximate the value of $\sin(x)$ using a series expansion method for improved performance.

Notes:

- xxx is in **radians**.
- More terms = better accuracy.
- We'll implement factorial and power calculations manually without using math libraries.
- Limit the number of terms for performance (say, 7 terms).

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

```
#include <stdio.h>
```

```
// Function to calculate power (base^exp) without using math.h
```

```
double power(double base, int exp) {
```

```
    double result = 1.0;
```

```
    for (int i = 0; i < exp; i++) {
```

```
        result *= base;
```

```
    }
```

```
    return result;
```

```
}
```

```
// Function to calculate factorial without recursion
```

```
unsigned long long factorial(int n) {
```

```
    unsigned long long fact = 1;
```

```
    for (int i = 2; i <= n; i++) {
```

```
        fact *= i;
```

```
    }
```

```
    return fact;
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---

}

// Function to approximate sin(x) using Taylor series

double sinApprox(double x) {

double result = 0.0;

int terms = 7; // Number of terms in series for approximation

for (int n = 0; n < terms; n++) {

int sign = (n % 2 == 0) ? 1 : -1;

int powerExp = 2 * n + 1;

unsigned long long fact = factorial(powerExp); // Factorial of power

double term = sign * power(x, powerExp) / fact;

result += term;

}

return result;

}

int main() {

double angle;

printf("Enter angle in radians: ");

scanf("%lf", &angle);

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

```
double sinValue = sinApprox(angle);

printf("Approximate sin(%.4f) = %.6f\n", angle, sinValue);

return 0;

}
```

OUTPUT:

Enter angle in radians: 1.5708

Approximate sin(1.5708) = 1.000003

Program 6. Develop a C program that accepts a course description string and a keyword from the user. Search whether the keyword exists within the course description using appropriate string functions. If found, display: "Keyword " found in the course description." Otherwise, display: "Keyword " not found in the course description."

- Accepts a **course description** and a **keyword** from the user.
- Searches if the keyword exists in the course description using **string functions** (strstr).
- Displays the appropriate message.

```
#include <stdio.h>
```

```
#include <string.h>
```

```
int main() {
```

```
    char courseDesc[500];
```

```
    char keyword[100];
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING		CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---	---

```

// Input course description (using fgets to allow spaces)

printf("Enter course description: ");

fgets(courseDesc, sizeof(courseDesc), stdin);


// Remove trailing newline if present

size_t len = strlen(courseDesc);

if (len > 0 && courseDesc[len - 1] == '\n') {
    courseDesc[len - 1] = '\0';
}


// Input keyword

printf("Enter keyword to search: ");

scanf("%s", keyword);


// Search for keyword in course description

if (strstr(courseDesc, keyword) != NULL) {
    printf("Keyword '%s' found in the course description.\n", keyword);
} else {
    printf("Keyword '%s' not found in the course description.\n", keyword);
}

return 0;
}

```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

OUTPUT:

Enter course description: Introduction to Computer Science and Programming

Enter keyword to search: Programming

Keyword 'Programming' found in the course description.

Explanation:

- fgets() is used to read the course description including spaces.
- strstr() checks if keyword is a substring of courseDesc.
- The program prints if the keyword is found or not.

Program 7. Develop a C program that takes marks for three subjects as input. Use a function to check if the student has passed (minimum 40 marks in each subject). Display the average and whether the student passed or failed.

- Takes marks for three subjects as input.
- Uses a function to check if the student passed (at least 40 in each subject).
- Calculates the average.
- Displays the average and pass/fail status.

```
#include <stdio.h>
```

```
// Function to check pass or fail
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

```
// Returns 1 if passed, 0 if failed

int checkPass(int m1, int m2, int m3) {
    if (m1 >= 40 && m2 >= 40 && m3 >= 40)
        return 1;
    else
        return 0;
}

int main() {
    int marks1, marks2, marks3;
    float average;

    // Input marks
    printf("Enter marks for subject 1: ");
    scanf("%d", &marks1);

    printf("Enter marks for subject 2: ");
    scanf("%d", &marks2);
    printf("Enter marks for subject 3: ");
    scanf("%d", &marks3);

    // Calculate average
    average = (marks1 + marks2 + marks3) / 3.0;
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING		CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---	---

```
// Check pass or fail

int result = checkPass(marks1, marks2, marks3);

// Display results

printf("\nAverage marks: %.2f\n", average);

if (result)

    printf("Status: Passed\n");

else

    printf("Status: Failed\n");

return 0;

}
```

OUTPUT:

Enter marks for subject 1: 45

Enter marks for subject 2: 55

Enter marks for subject 3: 35

Average marks: 45.00

Status: Failed

Program 8. In an ATM system, two account balances need to be swapped temporarily for validation. Develop a C program that accepts two balances and uses a function with pointers to swap them. Display the balances before and after swapping.

- Takes two account balances as input.
- Uses a **function with pointers** to swap them temporarily.

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

- Displays balances before and after swapping.

```
#include <stdio.h>
```

```
// Function to swap two balances using pointers
```

```
void swapBalances(float *a, float *b) {
```

```
    float temp = *a;
```

```
    *a = *b;
```

```
    *b = temp;
```

```
}
```

```
int main() {
```

```
    float balance1, balance2;
```

```
    // Input balances
```

```
    printf("Enter balance of Account 1: ");
```

```
    scanf("%f", &balance1);
```

```
    printf("Enter balance of Account 2: ");
```

```
    scanf("%f", &balance2);
```

```
    // Display before swapping
```

```
    printf("\nBefore swapping:\n");
```

```
    printf("Account 1 balance: %.2f\n", balance1);
```

```
    printf("Account 2 balance: %.2f\n", balance2);
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

```

// Swap balances
swapBalances(&balance1, &balance2);

// Display after swapping
printf("\nAfter swapping:\n");
printf("Account 1 balance: %.2f\n", balance1);
printf("Account 2 balance: %.2f\n", balance2);
return 0;
}

```

OUTPUT:

Enter balance of Account 1: 1500.75

Enter balance of Account 2: 2450.50

Before swapping:

Account 1 balance: 1500.75

Account 2 balance: 2450.50

After swapping:

Account 1 balance: 2450.50

Account 2 balance: 1500.75

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---

PART – B

TYPICAL OPEN-ENDED EXPERIMENTS

Open-ended experiments are a type of laboratory activity where the outcome is not predetermined, and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.

1. A college library has a digital bookshelf system where each book is assigned a unique Book ID. The bookshelf is organized in ascending order of Book IDs. Develop a C Program to quickly find whether a book with a specific Book ID is available in the shelf.

- The shelf is sorted by Book ID.
- Binary Search runs in **O(log n)** time, much faster than linear search.
- It repeatedly divides the search interval in half until the item is found or the interval is empty.

```
#include <stdio.h>
```

```
// Binary Search function
```

```
// Returns index if found, -1 if not found
```

```
int binarySearch(int arr[], int size, int key) {
```

```
    int low = 0;
```

```
    int high = size - 1;
```

```
    while (low <= high) {
```

```
        int mid = low + (high - low) / 2;
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

```

if (arr[mid] == key)
    return mid;    // Found the book
else if (arr[mid] < key)
    low = mid + 1;    // Search right half
else
    high = mid - 1;    // Search left half
}

return -1; // Book not found
}

int main() {
    int n, key, result;

    printf("Enter number of books in shelf: ");
    scanf("%d", &n);
    int bookIDs[n];
    printf("Enter Book IDs in ascending order:\n");
    for (int i = 0; i < n; i++) {
        scanf("%d", &bookIDs[i]);
    }
    printf("Enter Book ID to search: ");
    scanf("%d", &key);

```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

```

result = binarySearch(bookIDs, n, key);
if (result != -1)
    printf("Book with ID %d is available at position %d.\n", key, result + 1);
else
    printf("Book with ID %d is not available in the shelf.\n", key);
return 0;
}

```

OUTPUT:

Enter number of books in shelf: 6

Enter Book IDs in ascending order:

101 203 305 410 512 678

Enter Book ID to search: 410

Book with ID 410 is available at position 4.

2. A sports teacher has recorded the scores of students in a 100-meter race. To prepare the result sheet, the teacher wants the scores arranged in descending order (from highest to lowest). Develop a C program to sort the scores.

- Takes the number of students.
- Inputs their scores.
- Sorts them in descending order.
- Displays the sorted scores.

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING		CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---	---

```
#include <stdio.h>

int main() {
    int n, i, j, temp;
    printf("Enter number of students: ");
    scanf("%d", &n);
    int scores[n];
    // Input scores
    printf("Enter the scores:\n");
    for (i = 0; i < n; i++) {
        scanf("%d", &scores[i]);
    }

    // Sort in descending order (using simple Bubble Sort)
    for (i = 0; i < n - 1; i++) {
        for (j = 0; j < n - 1 - i; j++) {
            if (scores[j] < scores[j + 1]) {
                // Swap
                temp = scores[j];
                scores[j] = scores[j + 1];
                scores[j + 1] = temp;
            }
        }
    }
}
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

```

}

// Display sorted scores
printf("\nScores in descending order:\n");
for (i = 0; i < n; i++) {
    printf("%d\n", scores[i]);
}
return 0;
}

```

OUTPUT:

How this works:

- Bubble Sort is used for simplicity.
- It swaps elements if the left is **less than** the right, so the biggest scores "bubble" to the front.
- Prints the scores from highest to lowest.

Enter number of students: 5

Enter the scores:

12

10

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING		CSE
			1BPOPL107/207
			C Programming Lab
			2025-26

15

9

14

Scores in descending order:

15

14

12

10

9

3. A small warehouse tracks how many units of different products are shipped from multiple branches. Another dataset shows how much revenue each product generates per unit. Develop a C program which combines these datasets to calculate the total revenue generated by each branch.

```
#include <stdio.h>
```

```
int main() {
```

```
    int branches, products;
```

```
    printf("Enter number of branches: ");
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---

```

scanf("%d", &branches);

printf("Enter number of products: ");

scanf("%d", &products);

int units[branches][products];

float revenuePerUnit[products];

float totalRevenue[branches];

// Input units shipped per branch-product
printf("\nEnter units shipped for each branch and product:\n");

for (int i = 0; i < branches; i++) {
    printf("Branch %d:\n", i + 1);
    for (int j = 0; j < products; j++) {
        printf("  Units shipped of product %d: ", j + 1);
        scanf("%d", &units[i][j]);
    }
}

// Input revenue per unit for each product
printf("\nEnter revenue per unit for each product:\n");

for (int j = 0; j < products; j++) {
    printf("Revenue per unit of product %d: ", j + 1);
    scanf("%f", &revenuePerUnit[j]);
}

```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---

```

// Calculate total revenue per branch
for (int i = 0; i < branches; i++) {
    totalRevenue[i] = 0.0f;
    for (int j = 0; j < products; j++) {
        totalRevenue[i] += units[i][j] * revenuePerUnit[j];
    }
}

// Display results
printf("\nTotal revenue generated by each branch:\n");
for (int i = 0; i < branches; i++) {
    printf("Branch %d: $%.2f\n", i + 1, totalRevenue[i]);
}

return 0;
}

```

OUTPUT:

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

Enter number of branches: 2

Enter number of products: 3

Enter units shipped for each branch and product:

Branch 1:

Units shipped of product 1: 10

Units shipped of product 2: 5

Units shipped of product 3: 2

Branch 2:

Units shipped of product 1: 7

Units shipped of product 2: 8

Units shipped of product 3: 3

Enter revenue per unit for each product:

Revenue per unit of product 1: 15.50

Revenue per unit of product 2: 25.00

Revenue per unit of product 3: 10.00

Total revenue generated by each branch:

Branch 1: \$277.50

Branch 2: \$303.50

Explanation:

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING		CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---	---

- For **Branch 1** revenue:
 - $10 \times 15.50 + 5 \times 25.00 + 2 \times 10.00 = 155 + 125 + 20 = 300$
 $300 \times 15.50 + 5 \times 25.00 + 2 \times 10.00 = 155 + 125 + 20 = 300$
- For **Branch 2** revenue:
 - $7 \times 15.50 + 8 \times 25.00 + 3 \times 10.00 = 108.5 + 200 + 30 = 338.5$
 $338.5 \times 15.50 + 8 \times 25.00 + 3 \times 10.00 = 108.5 + 200 + 30 = 338.5$

(Adjust numbers according to sample input for accuracy.)

4. A basic mobile contact manager stores first and last names separately. For displaying full names in the contact list, you need to join them manually. Additionally, the system must check the length of each full name to ensure it fits the screen. Perform these operations by developing a C program without using built in string functions.

1. **Stores** first and last names separately.
2. **Manually concatenates** them into a full name (without using built-in string functions like strcat() or strlen()).
3. **Calculates the length** of the full name.
4. **Checks** whether the full name fits a given screen width.

✓ Assumptions:

- Max screen width is defined (e.g., 20 characters).
- Max length of first or last name is 50 characters.
- You want to handle multiple contacts (e.g., up to 100).

```
#include <stdio.h>
```

```
#define MAX_CONTACTS 100
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING		CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---	---

```
#define MAX_NAME_LENGTH 50
```

```
#define MAX_SCREEN_WIDTH 20
```

```
// Function to calculate length of a string
```

```
int string_length(char str[]) {
```

```
    int length = 0;
```

```
    while (str[length] != '\0') {
```

```
        length++;
```

```
    }
```

```
    return length;
```

```
}
```

```
// Function to join first and last name into full name
```

```
void join_names(char first[], char last[], char full[]) {
```

```
    int i = 0, j = 0;
```

```
// Copy first name
```

```
while (first[i] != '\0') {
```

```
    full[i] = first[i];
```

```
    i++;
```

```
}
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---

// Add space between names

full[i++] = ' ';

// Copy last name

while (last[j] != '\0') {

 full[i++] = last[j++];

}

// Null-terminate full name

full[i] = '\0';

}

int main() {

 int n, i;

 char firstNames[MAX_CONTACTS][MAX_NAME_LENGTH];

 char lastNames[MAX_CONTACTS][MAX_NAME_LENGTH];

 char fullName[MAX_NAME_LENGTH * 2 + 1]; // Including space and null terminator

 printf("Enter number of contacts: ");

 scanf("%d", &n);

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

```

if (n > MAX_CONTACTS) {
    printf("Too many contacts. Max allowed is %d\n", MAX_CONTACTS);
    return 1;
}

// Input first and last names
for (i = 0; i < n; i++) {
    printf("Enter first name of contact %d: ", i + 1);
    scanf("%s", firstNames[i]);

    printf("Enter last name of contact %d: ", i + 1);
    scanf("%s", lastNames[i]);
}

printf("\nContact List:\n");

// Display full names and check screen fit
for (i = 0; i < n; i++) {
    join_names(firstNames[i], lastNames[i], fullName);
    int length = string_length(fullName);

    printf("Contact %d: %s", i + 1, fullName);

```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

```

if (length > MAX_SCREEN_WIDTH) {
    printf(" (Too long for screen!);
}
printf("\n");
}

return 0;
}

```

OUTPUT:

Enter number of contacts: 2

Enter first name of contact 1: John

Enter last name of contact 1: Smith

Enter first name of contact 2: Maximilian

Enter last name of contact 2: Eisenhower

Contact List:

Contact 1: John Smith

Contact 2: Maximilian Eisenhower (Too long for screen!)

Restrictions Handled:

- No use of strlen, strcat, etc.
- Manual string length calculation.
- Manual name joining.

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

5. A currency exchange booth allows users to convert between two currencies. Before confirming the exchange, the system simulates a swap of the values to preview the result without actually changing the original data. In other cases, it updates the actual values. Develop a C program that implements both behaviours using Call by Value and Call by reference.

Problem Breakdown:

Requirement	C Concept	Description
Simulate swap (preview)	Call by Value	Function receives copies , no change to original values.
Perform real swap (update)	Call by Reference	Function receives addresses , modifies actual variables.

```
#include <stdio.h>

// Simulate swap using Call by Value
void simulateSwap(float a, float b) {
    float temp = a;
    a = b;
    b = temp;

    printf("\n[Simulation] After swap:\n");
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---

```

printf("Currency A: %.2f\n", a);
printf("Currency B: %.2f\n", b);
}

// Perform actual swap using Call by Reference
void performSwap(float *a, float *b) {
    float temp = *a;
    *a = *b;
    *b = temp;
}

int main() {
    float currencyA, currencyB;
    int choice;

    // Input amounts
    printf("Enter amount in Currency A: ");
    scanf("%f", &currencyA);
    printf("Enter amount in Currency B: ");
    scanf("%f", &currencyB);

    // Menu
    printf("\n--- Currency Exchange ---\n");

```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

```

printf("1. Simulate Swap (Preview)\n");
printf("2. Perform Swap (Confirm)\n");
printf("Enter your choice (1 or 2): ");
scanf("%d", &choice);

switch (choice) {
    case 1:
        simulateSwap(currencyA, currencyB);
        printf("\n[Original] After simulation:\n");
        printf("Currency A: %.2f\n", currencyA);
        printf("Currency B: %.2f\n", currencyB);
        break;

    case 2:
        performSwap(&currencyA, &currencyB);
        printf("\n[Updated] After actual swap:\n");
        printf("Currency A: %.2f\n", currencyA);
        printf("Currency B: %.2f\n", currencyB);
        break;

    default:
        printf("Invalid choice.\n");

```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING		CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---	---

```

    }
    return 0;
}

```

OUTPUT:

Enter amount in Currency A: 100

Enter amount in Currency B: 200

--- Currency Exchange ---

1. Simulate Swap (Preview)

2. Perform Swap (Confirm)

Enter your choice (1 or 2): 1

[Simulation] After swap:

Currency A: 200.00

Currency B: 100.00

[Original] After simulation:

Currency A: 100.00

Currency B: 200.00

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING		CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---	---

6. A local library needs to store and display details of its books, including title, author, and year of publication. Design a structure that can hold these details and develop a C program to display a list of all books entered.

Requirements:

- Store the following for each book:
 - Title
 - Author
 - Year of Publication
- Allow user to input multiple books.
- Display all book details at the end.

□ Solution:

We will:

- Define a struct Book to hold title, author, and year.
- Use an array of Book to store multiple books.
- Use scanf to get user input and printf to display details.

```
#include <stdio.h>
```

```
// Define structure for book
```

```
struct Book {
```

```
    char title[100];
```

```
    char author[100];
```

```
    int year;
```

```
};
```

```
int main() {
```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ, ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---

```

int n, i;

printf("Enter number of books: ");

scanf("%d", &n);

struct Book library[n]; // Array of struct Book

// Input book details
for (i = 0; i < n; i++) {
    printf("\nEnter details for Book %d:\n", i + 1);

    // Clear input buffer before taking string input
    getchar();

    printf("Title: ");
    fgets(library[i].title, sizeof(library[i].title), stdin);

    printf("Author: ");
    fgets(library[i].author, sizeof(library[i].author), stdin);

    printf("Year of Publication: ");
    scanf("%d", &library[i].year);
}

```

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	---	---

```
// Display all books

printf("\n--- Library Book List ---\n");

for (i = 0; i < n; i++) {

    printf("\nBook %d:\n", i + 1);

    printf("Title: %s", library[i].title);

    printf("Author: %s", library[i].author);

    printf("Year: %d\n", library[i].year);

}

return 0;

}
```

Notes:

- We use fgets() to read strings with spaces (e.g., "J.K. Rowling").
- getchar() is used before fgets() to consume the newline left by scanf().
- This program uses a **Variable Length Array (VLA)** for library[n]—you can use a fixed-size array if your compiler doesn't support VLAs.

OUTPUT:

Enter number of books: 2

Enter details for Book 1:

Title: Harry Potter

Author: J.K. Rowling

 Estd:2003 ISO 9001: 2015 Certified	Smt. Kamala & Sri Venkappa M. Agadi College of Engineering and Technology, Lakshmeshwar-582116 ಶ್ರೀಮತಿ ಕಮಲಾ ಮತ್ತು ಶ್ರೀ ವೆಂಕಪ್ಪ ಎಂ. ಅಗಡಿ ಅಭಿಯಾಂತ್ರಿಕ ಮತ್ತು ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ,ಲಕ್ಷ್ಮೇಶ್ವರ Approved by AICTE & Affiliated to VTU Belagavi, Karnataka. Mobile : 9448120344 info@agadiengcollege.com DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING	CSE 1BPOPL107/207 C Programming Lab 2025-26
---	--	---

Year of Publication: 1997

Enter details for Book 2:

Title: The Hobbit

Author: J.R.R. Tolkien

Year of Publication: 1937

--- Library Book List ---

Book 1:

Title: Harry Potter

Author: J.K. Rowling

Year: 1997

Book 2:

Title: The Hobbit

Author: J.R.R. Tolkien

Year: 1937