## a) Write a C program that uses functions to perform the following Operations
## i) Reading a complex number

```
#include <stdio.h>

// Structure to represent a complex number

struct Complex {

   float real;

   float imag;

};

// Function to read a complex number

struct Complex readComplexNumber() {

   struct Complex num;

   printf("Enter real part: ");

   scanf("%f", &num.real);

   printf("Enter imaginary part: ");

   scanf("%f", &num.imag);

   return num;

}

int main() {

   struct Complex number;

   // Read complex number

   printf("Enter the complex number:\n");

   number = readComplexNumber();
```

```
    // Display the complex number
    printf("The complex number entered is: %.2f + %.2f i \n",
number.real, number.imag);
    return 0;
}
```

```
Enter the complex number:
Enter real part: 3.5
Enter imaginary part: 2.7
The complex number entered is: 3.50 + 2.70i
```

## ii)Writing a complex number

```
#include <stdio.h>
// Structure to represent a complex number
struct Complex {
    float real;
    float imag;
};
// Function to read a complex number
struct Complex readComplexNumber() {
    struct Complex num;
    printf("Enter real part: ");
    scanf("%f", &num.real);
```

```
    printf("Enter imaginary part: ");
    scanf("%f", &num.imag);
    return num;
}
int main() {
    struct Complex number;
    // Read complex number
    printf("Enter the complex number:\n");
    number = readComplexNumber();
    // Display the complex number
    printf("The complex number entered is: %.2f + %.2fi\n", number.real,
number.imag);
    return 0;
}
```

```
Enter the complex number:
Enter real part: 3.5
Enter imaginary part: 2.7
The complex number entered is: 3.50 + 2.70i
```

## iii)Addition of two complex numbers

```
#include <stdio.h>
// Structure to represent a complex number
struct Complex {
```

```
    float real;
    float imag;
};
// Function to add two complex numbers
struct Complex addComplex(struct Complex num1, struct
Complex num2) {
    struct Complex result;
    result.real = num1.real + num2.real;
    result.imag = num1.imag + num2.imag;
    return result;
}
// Function to read a complex number
struct Complex readComplexNumber() {
    struct Complex num;
    printf("Enter real part: ");
    scanf("%f", &num.real);
    printf("Enter imaginary part: ");
    scanf("%f", &num.imag);
    return num;
}
// Function to write a complex number
void writeComplexNumber(struct Complex num) {
    printf("The complex number is: %.2f + %.2f i \n", num.real,
num.imag);
```

```
}
int main() {
    struct Complex number1, number2, sum;
    // Read the first complex number
    printf("Enter the first complex number:\n");
    number1 = readComplexNumber();
    // Read the second complex number
    printf("Enter the second complex number:\n");
    number2 = readComplexNumber();
    // Perform addition
    sum = addComplex(number1, number2);
    // Display the result
    printf("The sum of the complex numbers is: %.2f + %.2fi\n",
sum.real, sum.imag);
    return 0;
}
```

**iv) Multiplication of two complex numbers**

```
#include <stdio.h>
// Structure to represent a complex number
struct Complex {
    float real;
```

```
    float imag;
};
// Function to multiply two complex numbers
struct Complex multiplyComplex(struct Complex num1, struct
Complex num2) {
    struct Complex result;
    result.real = (num1.real * num2.real) + (num1.imag *
num2.imag);
    //result.imag = (num1.real * num2.imag) + (num1.imag *
num2.real);
    return result;
}
// Function to read a complex number
struct Complex readComplexNumber() {
    struct Complex num;
    printf("Enter real part: ");
    scanf("%f", &num.real);
    printf("Enter imaginary part: ");
    scanf("%f", &num.imag);
    return num;
}
// Function to write a complex number
void writeComplexNumber(struct Complex num) {
```

```
    printf("The complex number is: %.2f + %.2fi\n", num.real,
num.imag);
}
int main() {
    struct Complex number1, number2, product;
    // Read the first complex number
    printf("Enter the first complex number:\n");
    number1 = readComplexNumber();
    // Read the second complex number
    printf("Enter the second complex number:\n");
    number2 = readComplexNumber();
    // Perform multiplication
    product = multiplyComplex(number1, number2);
    // Display the result
    printf("The product of the complex numbers is: %.2f + %.2fi\n",
product.real, product.imag);

    return 0;
}
```

**b) Write a c program to store records of n students based on roll_no, name, gender and 5 subject marks**

**i) calculate percentage each student using 5 subjects**

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

```
// Structure to represent a student record
struct Student {
    int roll_no;
    char name[50];
    char gender;
    int marks[5]; // Array to store marks of 5 subjects
    float percentage;
};

// Function to calculate percentage of a student
void calculatePercentage(struct Student *s) {
    int total = 0;
    for (int i = 0; i < 5; i++) {
        total += s->marks[i];
    }
    s->percentage = (float)total / 5;
}

int main() {
    int n;
    printf("Enter the number of students: ");
    scanf("%d", &n);

    // Array to store records of n students
    struct Student students[n];

    // Input student records
    for (int i = 0; i < n; i++) {
        printf("\nEnter details of student %d:\n", i + 1);
        printf("Roll Number: ");
        scanf("%d", &students[i].roll_no);
```

```
            printf("Name: ");
            scanf("%s", students[i].name);
            printf("Gender (M/F): ");
            scanf(" %c", &students[i].gender);
            printf("Enter marks of 5 subjects:\n");
            for (int j = 0; j < 5; j++) {
                printf("Subject %d: ", j + 1);
                scanf("%d", &students[i].marks[j]);
            }
            calculatePercentage(&students[i]); // Calculate
        percentage for each student
        }

        // Display student records along with percentages
        printf("\nStudent Records:\n");
        printf("Roll No\tName\tGender\tPercentage\n");
        for (int i = 0; i < n; i++) {
            printf("%d\t%s\t%c\t%.2f%%\n", students[i].roll_no,
        students[i].name, students[i].gender,
        students[i].percentage);
        }

        return 0;
    }
```

```
#include <stdio.h>

// Structure to represent a student record

struct Student {
```

```
    int roll_no;
    char name[50];
    char gender;
    int marks[5]; // Array to store marks of 5 subjects
    float percentage;
};
// Function to calculate percentage of a student
void calculatePercentage(struct Student *s) {
    int total = 0;
    for (int i = 0; i < 5; i++) {
        total += s->marks[i];
    }
    s->percentage = (float)total / 5;
}
// Function to swap two student records
void swap(struct Student *a, struct Student *b) {
    struct Student temp = *a;
    *a = *b;
    *b = temp;
}
// Function to sort students based on their percentages (in descending
order)
```

```
void sortByPercentage(struct Student students[], int n) {
    for (int i = 0; i < n - 1; i++) {
        for (int j = 0; j < n - i - 1; j++) {
            if (students[j].percentage < students[j + 1].percentage) {
                swap(&students[j], &students[j + 1]);
            }
        }
    }
}
int main() {
    int n;
    printf("Enter the number of students: ");
    scanf("%d", &n);
    // Array to store records of n students
    struct Student students[n];
    // Input student records
    for (int i = 0; i < n; i++) {
        printf("\nEnter details of student %d:\n", i + 1);
        printf("Roll Number: ");
        scanf("%d", &students[i].roll_no);
        printf("Name: ");
        scanf("%s", students[i].name);
```

```
        printf("Gender (M/F): ");
        scanf(" %c", &students[i].gender);
        printf("Enter marks of 5 subjects:\n");
        for (int j = 0; j < 5; j++) {
            printf("Subject %d: ", j + 1);
            scanf("%d", &students[i].marks[j]);
        }
        calculatePercentage(&students[i]); // Calculate percentage for each
student
    }
    // Sort students based on their percentages
    sortByPercentage(students, n);

    // Display student records along with percentages
    printf("\nStudent List Sorted by Percentage:\n");
    printf("Roll No\tName\tGender\tPercentage\n");
    for (int i = 0; i < n; i++) {
        printf("%d\t%s\t%c\t%.2f%%\n", students[i].roll_no,
students[i].name, students[i].gender, students[i].percentage);
    }

    return 0;
}
```