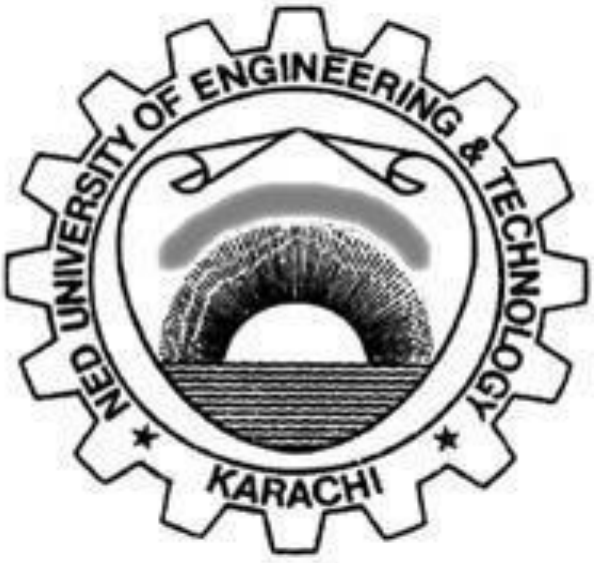
Practical Workbook

CT-175
PROGRAMMING FUNDAMENTALS



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EXERCISE Q# 01

Write a C program to input a character from user and check whether given character is small alphabet, capital alphabet, digit or special character, using if else.

```
#include <stdio.h>
 int main()
{     char
ch;
    printf("Enter a character: ");
scanf("%c", &ch);

    if (ch >= 'A' && ch <= 'Z') {
        printf("%c is an upper case alphabet\n", ch);
    }
    else if (ch >= 'a' && ch <= 'z') {
        printf("%c is a lower case alphabet\n", ch);
    }
    else if (ch == '*' || ch == '$') {
        printf("%c is a special character\n", ch);
    }
    else if (ch >= '0' && ch <= '9') {
printf("%c is a digit\n", ch);
    }
else {
        printf("%c is another character\n", ch);
    }
    return 0;
}
```

OUTPUT:

```
Enter a character: A
A is an upper case alphabet

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Enter a character: a
a is a lower case alphabet

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Enter a character: 2
2 is a digit

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Enter a character: $
$ is a special character
```

EXERCISE Q# 02

An online shopping store is providing discounts on the items due to the Eid. If the cost of items is more than 1999 it will give a discount up to 50%. If the cost of shopping is 2000 to 4000, a 20% discount will be applied. If the cost of shopping is 4001 to 6000, a 30% discount will be applied. If it's more than 6000 then 50% discount will be applied to the cost of shopping. Print the actual amount, saved amount and the amount after discount.

```
#include <stdio.h> int main() {
float actual_amount , discount = 0, saved_amount, amount_after_discount;

 printf("Enter the total amount of items: ");
scanf("%f", &actual_amount);
   if (actual_amount >= 2000 && actual_amount <= 4000) {
discount = 0.20; // 20% discount
    }
    else if (actual_amount >= 4001 && actual_amount <= 6000) {
discount = 0.30; // 30% discount
    }
    else if (actual_amount > 6000) {
discount = 0.50; // 50% discount
    }
    saved_amount = actual_amount * discount;
    amount_after_discount = actual_amount - saved_amount;
   printf("Actual amount: %f\n", actual_amount);
printf("Discount applied: %f%%\n", discount *
100);
 printf("Saved amount: %f\n", saved_amount);
printf("Amount after discount:
%f\n",amount_after_discount);  return 0;
```

```
}
```

OUTPUT:

```
Enter the total amount of items: 30000
Actual amount: 30000.000000
Discount applied: 50%
Saved amount: 15000.000000
Amount after discount: 15000.000000
```

EXERCISE Q# 03

Write a C program to find all roots of a quadratic equation by using the given formula; it is required to take user input for a, b and c values.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

```
#include <stdio.h>
#include <math.h>
int main() {
  float a, b, c, discriminant, y1, y2;
printf("Enter the value of a: ");
scanf("%f", &a);
 printf("Enter the value of b: ");
scanf("%f", &b);
 printf("Enter the value of c: ");
scanf("%f", &c);
     if (a == 0) {
 printf("This is not a quadratic equation.\n");
}     discriminant = b * b - 4 * a * c;
     if (discriminant < 0)
{
        printf("The roots are imaginary.\n");
    } else if (discriminant == 0) {
      // One real root
 y1 = -b / (2 * a);
printf("There is one real root: %f\n", y1);
    } else {
  // Two real roots
  y1 = (-b + sqrt(discriminant)) / (2 * a);
y2 = (-b - sqrt(discriminant)) / (2 * a);
printf("First root = %f\n", y1);
printf("Second root = %f\n", y2);
    }
return 0;
}
```

OUTPUT:

```
Enter the value of a: 0
Enter the value of b: 1
Enter the value of c: 2
This is not a quadratic

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Enter the value of a: 2
Enter the value of b:
4
Enter the value of c: 3
The roots are imaginary.

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Enter the value of a: 30
Enter the value of b: 77
Enter the value of c: 8
First root = -0.108481
Second root = -2.458186
```

EXERCISE Q# 04

Teacher asks the student to check whether the input number is divisible by 7 or not. For checking the divisibility, take the last digit and double it, take the rest of the digits and subtract the doubled last digit repeat until the result is 7, -7 or 0. For example: 10976 -> 1097-12 = 1085 -> 108-10 = 98 -> 9-16 = -7 49 -> 4 - 18 = 14 -> 1 - 8 = -7

```
#include <stdio.h>
int main() {
 int num, lastDigit, remaining_num, result;
printf("Enter a number: ");
scanf("%d", &num);
     while (num != 7 && num != -7 && num != 0) {
lastDigit = num % 10;       // Get the last digit
remaining_num = num / 10;    // Get the rest of the number

lastDigit *= 2;
 result = remaining_num - lastDigit;
  num = result;
    } if (num==0 || num==7 || num== -7)
{
        printf("The number is divisible by 7.\n");
    } else {
 printf("The number is not divisible by 7.\n");
    }
return 0;
}
```

OUTPUT:

```
Enter a number: 10976
The number is divisible by 7.
```

EXERCISE Q# 05

Write a program that asks for the number of calories and fat grams in a food. The program should display the percentage of calories that come from fat. If the calories from fat are less than 30% of the total calories of the food, it should also display a message indicating that the food is low in fat.

One gram of fat has 9 calories, so Calories from fat = fat grams * 9. The percentage of calories from fat can be calculated as: calories from fat/total calories Input validation: Make sure the number of calories and fat grams are not less than 0. Also, the number of calories from fat cannot be greater than the total number of calories. If that happens, display an error message indicating that either the calories or fat grams were incorrectly entered.

```
#include <stdio.h>
int main() {
 float calories, fat_grams, calories_from_fat, percentage_calories_from_fat;
 printf("Enter the total number of calories: ");
scanf("%f", &calories);
printf("Enter the number of fat grams: ");
scanf("%f", &fat_grams);
         if (calories < 0 || fat_grams < 0) {
printf("Error: Calories and fat grams cannot be less than 0.\n");
return 1;
    }      calories_from_fat=
fat_grams * 9;
     if (calories_from_fat > calories) {
 printf("Error: Calories from fat cannot be greater than the total
calories.\n");
 return 1;
    }
percentage_calories_from_fat= (calories_from_fat / calories) * 100;

    printf("Percentage of calories from fat: %f%%\n",
percentage_calories_from_fat);

    if (percentage_calories_from_fat < 30) {
printf("This food is low in fat.\n");
    }
return 0;
}
```

OUTPUT:

```
Enter the total number of calories: -1
Enter the number of fat grams: -1
Error: Calories and fat grams cannot be less

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Enter the total number of calories: 30
Enter the number of fat grams: 21
Error: Calories from fat cannot be greater t

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Enter the total number of calories: 30
Enter the number of fat grams: 2
Percentage of calories from fat: 60.000004%
```