C-PROGRAMMING

ASHUTOSH PATEL

SECTION – AU 1

Assignment

Q1. Write a C program for calculating the price of a product after adding the sales tax to its original price. Where rate of tax and price is inputted by user.

Ans.
```
#include <stdio.h>
int main() {
   float tax, price, amount;
   printf("Enter the tax rate %%: ");
   scanf("%f", &tax);
   printf("Enter the price of product: ");
   scanf("%f", &price);
        tax = (tax / 100) *price;
   amount = price + tax;
   printf("Your Tax amount: %.2f\n", tax);
   printf("Final price of Product : %.2f\n", amount);
        return 0;}
```

Q2. Write a C program to calculate the weekly wages of an employee. The pay depends on wages per hour and number of hours worked. Moreover, if the employee has worked for more than 30 hours, then he or she gets twice the wages per hour, for every extra hour that he or she has worked.

Ans.
```
#include <stdio.h>
int main() {
   float x, y, z, w, extra;
   extra = 0;
   printf("Enter the Fix wages for an hour: ");
   scanf("%f", &x);
   printf("Enter Employee working hours in a Week: ");
   scanf("%f", &y);
   w=y-30;
   if (y > 30) {
        extra=(w*2*x);
        z=y*x+extra;
   }
   else
   {
        z=y*x;
        }
   printf("Regular wages: $%.2f\n", y*x);
   printf("Extra wages: $%.2f\n", extra);
   printf("Total weekly wages: $%.2f\n",z);
   return 0;}
```

Q.3 Mr. X goes to market for buying some fruits and vegetables. He is having a currency of Rs 500 with him for marketing. From a shop, he purchases 2.0 kg Apple priced Rs. 50.0 per kg, 1.5 kg Mango priced Rs.35.0 per kg, 2.5 kg Potato priced Rs.10.0 per kg, and 1.0 kg Tomato priced Rs.15 per kg. He gives the currency of Rs. 500 to the shopkeeper. Find out the amount shopkeeper will return to X by writing a C program.

Ans.
```
#include <stdio.h>
   int main() {
   float apple = 50.0;
   float mango = 35.0;
   float potato = 10.0;
   float tomato = 15.0;
   float a = 2.0;
   float m = 1.5;
   float p = 2.5;
   float t = 1.0;
   float cost = (apple * a) + (mango * m) +
                (potato * p) + (tomato * t);
   float total = 500.0;
   float x = total - cost;
   if (x >= 0) {
      printf("Left amount of Mr. X: Rs. %.2f\n", x);
   } else {
      printf("Mr. X does not have enough money to purchase these.");
   }
   return 0;
}
```

Q4.Write a C program to print your name, date of birth and mobile number in 3 different lines.

Ans..
```
#include <stdio.h>
int main() {
   char name[]= "ASHUTOSH";
   char dob[]= "January 1, 2000";
   char ph[]= "7895324242";
   printf("Name: %s\n", name);
   printf("Date of Birth: %s\n", dob);
   printf("Mobile Number: %s", ph);
   return 0;
}
```

Q5. Write a program to read an integer, a character and a float value from keyboard and display the same in different lines on the screen.

Ans.
```
#include <stdio.h>
   int main() {
   int x;
   char y;
   float z;
```

```
    printf("Enter an integer: ");
    scanf("%d", &x);
    printf("Enter a character: ");
    scanf(" %c", &y);
    printf("Enter a float value: ");
    scanf("%f", &z);
    printf("\nInteger: %d\n", x);
    printf("Character: %c\n", y);
    printf("Float: %.2f\n", z);
    return 0;
}
```

Q6.Write a program to print the following line (Assume the total value is contained in a variable named cost)

The sales total is : $ 172.53

Ans.

```
#include <stdio.h>
int main() {
    float x = 172.53;
    printf("The sales total is : $ %.2f\n", x);
    return 0;
}
```

Q7.Raju got 6 and half apples from each of Raghu, Sheenu and Akash. He wants to know how many apples he has in total without adding them. Write a program which could help Raju in doing this.

Ans.

```
#include <stdio.h>
int main() {
    float raghu = 6.5;
    float sheenu = 6.5;
    float akash = 6.5;
    float total = raghu + sheenu + akash;
    printf("Raju has %.1f apples.\n", total);
    return 0;
}
```

Q8.Write a program that prints the floating point value in exponential format correct to two decimal places.

Ans.

```
#include <stdio.h>
int main() {
    double a;
          printf("Enter floating Value: ");
          scanf("%f",&a);
    printf("Expontial Value is: %.2e\n", a);
    return 0;
}
```

Q9.Write a program to input and print your mobile number (i.e. of 10 digits).

Ans.

```
#include <stdio.h>
int main() {
    long long int mobileNumber;
```

```
    printf("Enter your 10-digit mobile number: ");
    scanf("%lld", &mobileNumber);
    if (mobileNumber >= 1000000000 && mobileNumber <= 9999999999) {
        printf("Your mobile number is: %lld\n", mobileNumber);
    } else {
        printf("Invalid input! Please enter a 10-digit mobile number.");
    }
    return 0;
}
```

Q10.The population of a city is 30000. It increases by 20 % during first year and 30% during the second year. Write a program to find the population after two years? (Ans: 46800)

Ans .

```
#include <stdio.h>
int main() {
    int p = 30000;
    float i1 = 20.0;
    float i2 = 30.0;
    float p1 = p * (1 + (i1 / 100));
    float p2 = p1 * (1 + (i2 / 100));
    printf("Population after two years: %.0f\n", p2);
    return 0;
}
```

Q11. Write a program to find the ASCII value of a character.

Ans.

```
#include <stdio.h>
int main() {
    char character;
    printf("Enter a character: ");
    scanf("%c", &character);
    int ascii = character;
    printf("The ASCII value of '%c' is %d\n", character, ascii);
    return 0;
}
```

Q12. Write a program to calculate salary of an employee, given his basic pay (entered by user), HRA=15% of the basic pay and TA=20% of the basic pay.

Ans.

```
#include <stdio.h>
int main() {
    float basicPay, hra, ta, salary;
    printf("Enter the basic pay: ");
    scanf("%f", &basicPay);
    hra = 0.15 * basicPay;
    ta = 0.20 * basicPay;
    salary = basicPay + hra + ta;
    printf("Basic Pay: %.2f\n", basicPay);
    printf("HRA: %.2f\n", hra);
    printf("TA: %.2f\n", ta);
    printf("Salary: %.2f\n", salary);
```

```
    return 0;
}
```

Q13. Write a program to find the slope of a line and angle of inclination that passes through two points P and Q with coordinates (xp, yp) and (xq, yq) respectively.

Ans.

```
#include <stdio.h>
#include <math.h>
int main() {
    float xp, yp, xq, yq,slope;
    printf("Coordinates of point P (xp yp): ");
    scanf("%f %f", &xp, &yp);
    printf("Coordinates of point Q (xq yq): ");
    scanf("%f %f", &xq, &yq);
    slope = (yq - yp) / (xq - xp);
    printf("Slope is: %.2f\n", slope);
    return 0;
}
```

*Q14. The SPI (Semester Performance Index) is a weighted average of the grade points earned by a student in all the courses he registered for in a semester. If the grade points associated with the letter grades awarded to a student are g1, g2, g3,…….gk etc. and the corresponding credits are c1, c2, c3,……ck, the SPI is given by:

$$\text{SPI} = \frac{\sum_{i=1}^{k} c_i g_i}{\sum_{i=1}^{k} c_i}$$

Where, k is the number of courses for which the candidate remains registered for during the semester/ trimester. Write a program in C to calculate SPI for k =5.

Ans

```
#include <stdio.h>
int main() {
    int numCourses;
    printf("Enter the number of courses: ");
    scanf("%d", &numCourses);
    double totalGradePoints = 0.0;
    double totalCredits = 0.0;
    for (int i = 1; i <= numCourses; i++) {
        double gradePoints, credits;
        printf("Enter grade points for course %d: ", i);
        scanf("%lf", &gradePoints);
        printf("Enter credits for course %d: ", i);
        scanf("%lf", &credits);

        totalGradePoints += gradePoints * credits;
        totalCredits += credits;
    }
    if (totalCredits > 0) {
        double spi = totalGradePoints / totalCredits;
        printf("SPI for the semester: %.2lf\n", spi);
    } else {
        printf("No courses or invalid input. Cannot calculate SPI.\n");
```

```
    }
    return 0;
}
```

Q 15. Write a program to calculate the frequency (f) of a given wave with wavelength (λ) and speed (c), where c=λ*f.

Ans.

```
#include <stdio.h>
int main() {
    double c=3000000000,w, f;
    printf("Enter the wavelength in metre: ");
    scanf("%lf", &w);
    f = c / w;
    printf("The frequency of the wave is %.4lf Hz\n", f);
    return 0;
}
```

Q 16. A car travelling at 30 m/s accelerates steadily at 5 m/s2 for a distance of 70 m. What is the final velocity of the car? [Hint: v2 = u2 + 2as]

Ans.

```
#include <stdio.h>
#include <math.h>
int main() {
    double velocity = 30.0;
    double acceleration = 5.0;
    double distance = 70.0;
    double final = sqrt(pow(velocity, 2) + 2 * acceleration * distance);
    printf("Car's velocity is %.2lf m/s\n", final);
    return 0;
}
```

Q 17.A horse accelerates steadily from rest at 4 m/s2 for 3s. (a) What is its final velocity? (b) How far has it travelled? [Hint: (a) v = u + at (b) s = ut + ½at2]

Ans.

```
#include <stdio.h>
int main() {
    double initial_velocity = 0.0;
    double acceleration = 4.0;
    double time = 3.0;
    double final_velocity = initial_velocity + (acceleration * time);
    printf("Final velocity: %.2lf m/s\n", final_velocity);
    double distance_traveled = (initial_velocity * time) + (0.5 * acceleration * time * time);
    printf("Distance traveled: %.2lf meters\n", distance_traveled);
    return 0;
}
```

Q 18. Write a program to find the sum of your four last digit of your university roll number.

Ans.

```
#include <stdio.h>
int main() {
   int roll = 1080302553,sum = 0;
   int digit = roll % 10000;
```

```
    while (digit > 0) {
        sum = sum + digit % 10;
        digit /= 10;
    }
    printf("Sum of the last four digits of the roll number: %d\n", sum);
    return 0;
}
```

Q19. Write a program to initialize your height and weight in cm. and kgs respectively demonstrating compile time initialization and convert them in feets and pounds respectively. **Note :- 1 cm = 0.393701inch , 1 Kg = 2.20462**

Ans.
```
#include <stdio.h>
int main() {
    float heightCm = 172.0;
    float weightKg = 50.0;
    float cmToInch = 0.393701;
    float kgToPound = 2.20462;
    float heightFeet = heightCm * cmToInch / 12.0;
    float weightPounds = weightKg * kgToPound;
    printf("Height: %.2f cm = %.2f feet\n", heightCm, heightFeet);
    printf("Weight: %.2f kg = %.2f pounds\n", weightKg, weightPounds);
    return 0;
}
```

Q 20 . Code the variable declarations for each of following:

a) A character variable named option.
b) An integer variable sum initialized to 0
c) A floating point variable, product, initialized to 1

Ans. a. `char option;`
b. `int sum = 0;`
c. `float product = 1.0;`

Q21. Write a program that reads nine integers. Display these numbers by printing three numbers in a line separated by commas.

Ans.
```
#include <stdio.h>
int main() {
    int numbers[9];
    printf("Enter nine integers, separated by spaces:\n");
    for (int i = 0; i < 9; i++) {
        scanf("%d", &numbers[i]);
    }
    printf("Numbers entered:\n");

    for (int i = 0; i < 9; i++) {
        printf("%d", numbers[i]);
        if ((i + 1) % 3 == 0) {
            printf("\n");
```

```
        } else {
            printf(", ");
        }
    }
    return 0;
}
```

Q22. What are header files and what are its uses in C programming?

Ans. Header file in C programming are the files that contains declarations of functions & variables that used in C programs. they proved a way to include external code module or libraries into the C program.

i.e. <stdio.h> & <math.h>

Q23. What will be the output of following program?

```
#include<stdio.h>
int main()
{   int num=070;
printf("%d\t%o\t%x",num,num,num);
}
```

Ans. 56 70 38

Q 24. What will be the output of following program?

```
#include <stdio.h>
void main()
{
int x = printf("GLA UNIVERSITY");
printf("%d", x);
 }
```

Ans. Output: GLA UNIVERSITY14

Q25. What are library functions? List any four library functions.

Ans. These are the pre-defined or built-in functions stored in c compiler and performed as there as a specific tasks.

1. printf()
2. scanf()
3. pow()
4. sqrt()

Q 41. What is the format specifier for an Octal Number?

Ans. %o

Q 42. Which format specifier is used to print the exponent value upto 2 decimal places.

Ans. %e

43. Which of the following is not a basic data type?

Ans. array

Q 44. What is the output of following code?

```
#include<stdio.h>
void main()
{
  int x=0;
  x= printf("\"hello\b\"");
```

```
  printf(“%d”,x);
}
```
Ans. "hell"8

*Q 45. What is the output of following code?

```
#include<stdio.h>
void main()
#include<stdio.h>
int main(){
  int b,c=5 ;
  printf("%d %d", b,c);
}
```
Ans. Garbage, 5

Q46. Which of the following is an identifier?

Ans. Basic_pay

Q 47. What is the output of the following program?

```
#include<stdio.h>
void main()
{char x, a=’c’;
   x=printf("%c",a);
   printf(“%d”,x);}
```
Ans. c1

Q48. Perform the following conversion from Decimal to other number as directed-

a) $(365.55)_{10} = (?)_2$
b) $(453.65)_{10} = (?)_8$
c) $(5164.12)_{10} = (?)_{16}$
d) $(23.65)_{10} = (?)_5$
e) $(772)_{10} = (?)_7$

Ans.a) $(365.55)_{10}$ in binary is $(101101101.1001100110011...)_2$

b) $(453.65)_{10}$ in octal is $(705.52)_8$.

c) $(5164.12)_{10}$ in hexadecimal is $(143C.1A3D70A3D70A3D7...)_{16}$.

d) $(23.65)_{10}$ in quinary is $(43.312)_5$.

e) $(772)_{10}$ in septenary is $(2011.0)_7$.

Q49. Covert the following numbers to decimal number system-

a) $(325.54)_6 = (?)_{10}$
b) $(1001010110101.1110101)_2 = (?)_{10}$
c) $(742.72)_8 = (?)_{10}$
d) $(AC94.C5)_{16} = (?)_{10}$

Ans.

a) $(325.54)_6 = (?)_{10}$

To convert a base-6 number to decimal, you can multiply each digit by the corresponding power of 6 and then sum them up:

(3 * 6^2) + (2 * 6^1) + (5 * 6^0) + (5 * 6^-1) + (4 * 6^-2) = 3 * 36 + 2 * 6 + 5 + 5/6 + 4/36 = 108 + 12 + 5 + 0.8333 + 0.1111 ≈ 126.9444
So, $(325.54)_6$ is approximately equal to $(126.9444)_{10}$ in decimal.

b) $(1001010110101.1110101)_2 = (?)_{10}$
To convert a binary number to decimal, you can multiply each digit by the corresponding power of 2 and then sum them up:
(1 * 2^12) + (0 * 2^11) + (0 * 2^10) + (1 * 2^9) + (0 * 2^8) + (1 * 2^7) + (0 * 2^6) + (1 * 2^5) + (1 * 2^4) + (0 * 2^3) + (1 * 2^2) + (0 * 2^1) + (1 * 2^0) + (1 * 2^-1) + (1 * 2^-2) + (1 * 2^-3) + (0 * 2^-4) + (1 * 2^-5) ≈ 6885.984375
So, $(1001010110101.1110101)_2$ is approximately equal to $(6885.984375)_{10}$ in decimal.

c) $(742.72)_8 = (?)_{10}$
To convert an octal number to decimal, you can multiply each digit by the corresponding power of 8 and then sum them up:
(7 * 8^2) + (4 * 8^1) + (2 * 8^0) + (7 * 8^-1) + (2 * 8^-2) = 7 * 64 + 4 * 8 + 2 + 7/8 + 2/64 = 448 + 32 + 2 + 0.875 + 0.03125 ≈ 483.9062
So, $(742.72)_8$ is approximately equal to $(483.90625)_{10}$ in decimal.

d) $(AC94.C5)_{16} = (?)_{10}$
To convert a hexadecimal number to decimal, you can multiply each digit by the corresponding power of 16 and then sum them up:
(A * 16^4) + (C * 16^3) + (9 * 16^2) + (4 * 16^1) + (C * 16^0) + (5 * 16^-1) ≈ 40960 + 3072 + 2304 + 64 + 12 + 0.3125 ≈ 46323.3125
So, $(AC94.C5)_{16}$ is approximately equal to $(46323.3125)_{10}$ in decimal.

Q50. Perform the following conversion from Hexadecimal to other number as directed-
Ans.a) To convert to binary (base-2):
Start by converting each hexadecimal digit to its binary equivalent:
D = 1101
B = 1011
5 = 0101
6 = 0110
C = 1100
D = 1101
4 = 0100

Combine these binary equivalents together with the decimal point:
(DB56.CD4)16 = (1101101101010110.110011010100)2

b) To convert to octal (base-8):
Group the binary digits into sets of three, starting from the binary point, and then convert each set to octal:
(110 110 110 101 011 0.110 011 010 100)2 = (333 532.314)8

c) To convert to quaternary (base-4):

Group the binary digits into sets of two, starting from the binary point, and then convert each set to quaternary:
(11 01 10 11 01 01 10.11 00 11 01 01 00)2 = (331323.3221)4

So, (DB56.CD4)16 is equivalent to (1101101101010110.110011010100)2, (333 532.314)8, and (331323.3221)4 in binary, octal, and quaternary, respectively.

Q51. Perform the following conversion from octal to other number as directed-

$(473.42)_8 = (?)_2, \quad (?)_{10}, \quad (?)_{16}, \quad (?)_5$

Ans.

a) To binary (base-2):
First, convert each octal digit to its binary equivalent:
4 = 100
7 = 111
3 = 011
4 = 100
.
4 = 100
2 = 010

Combine these binary equivalents together with the binary point:
$(473.42)_8 = (100111001.0100010)_2$

b) To decimal (base-10):
To convert from octal to decimal, you can multiply each digit by the corresponding power of 8 and sum them up:
4 * 8^2 + 7 * 8^1 + 3 * 8^0 + 4 * 8^-1 + 2 * 8^-2 = 256 + 56 + 3 + 0.5 + 0.25 = 315.75

So, (473.42)8 is equivalent to (100111001.0100010)2 in binary and 315.75 in decimal.

c) To hexadecimal (base-16):
First, convert the whole number part (473) to hexadecimal:
473 / 16 = 29 remainder 9
29 / 16 = 1 remainder 13 (C in hexadecimal)
1 / 16 = 0 remainder 1

So, the whole number part is C91 in hexadecimal.

Now, convert the fractional part (0.42) to hexadecimal. Multiply it by 16:
0.42 * 16 = 6.72
0.72 * 16 = 11.52 (B in hexadecimal)
0.52 * 16 = 8.32 (8 in hexadecimal)

Combine the whole and fractional parts:
$(473.42)_8 = (C91.B8)_{16}$

d) To quinary (base-5):

First, convert each octal digit to its quinary equivalent:
4 = 4
7 = 12
3 = 3
4 = 4
.
4 = 4
2 = 2
Combine these quinary equivalents together with the quinary point:
$(473.42)_8 = (431.42)_5$
So, $(473.42)_8$ is equivalent to $(100111001.0100010)_2$ in binary, 315.75 in decimal, $(C91.B8)_{16}$ in hexadecimal, and $(431.42)_5$ in quinary.

Q52. Find the value of A?

a) $(23)_{10} = (17)_A$
b) $(21)_{16} = (41_{)A}$
c) $(32)_8 = (101)_A$

Ans a) $(23)_{10} = (17)_A$
This equation is in base 10. To solve for A, we can rewrite it as:
2A + 3 = 17
Now, subtract 3 from both sides:
2A = 17 - 3
2A = 14
Finally, divide by 2:
A = 14 / 2
A = 7
So, the value of A in this case is A = 7.
b) $(21)_{16} = (41)_A$
This equation is in hexadecimal (base 16). To solve for A, we can rewrite it as:
2A + 1 = 4A + 1
Now, subtract 1 from both sides:
2A = 4A
Divide by 2:
A = 4A / 2
A = 2A
Now, to solve for A, we can see that A must be 0 because 2A = 2 * 0 = 0.
So, the value of A in this case is A = 0.
c) $(32)_8 = (101)_A$
This equation is in octal (base 8). To solve for A, we can rewrite it as:
3A + 2 = 10A + 1
Now, subtract 2 from both sides:
3A = 10A - 1
Subtract 10A from both sides:
-7A = -1
Divide by -7:
A = -1 / -7

A = 1/7

So, the value of A in this case is A = 1/7.

Q53: What will be the output of following program? Assume integer is of 2 bytes

```
void main(){
int  a=32770;
printf("%d",a);
}
```

Ans. The value 32770 exceeds the maximum representable value for a 2-byte integer, so it will result in an integer overflow. In most programming languages, including C, when an integer overflow occurs, the value wraps around to the minimum representable value. So, in this case, the output will be:

-32,768

The program will print -32,768 as the output.

Q54:

```
#include <stdio.h>
 int main()
{
 float c = 5.0;
 printf ("Temperature in Fahrenheit is %.2f", (9/5)*c + 32);
 return 0;
}
```

Ans. Output: Temperature in Fahrenheit is 37.00

ASHUTOSH PATEL
SECTION AU-1