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SECTION : AL
ROLL NO. : 2
SUBJECT : COMPUTER PROGRAMMING

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.

CODE:

```
#include<stdio.h>
int main() {
   float oriprice,taxrate,tprice;
   printf("Enter the original price : ");
   scanf("%f",&oriprice);
   printf("Enter the tax rate (in %%) : ");
   scanf("%f",&taxrate);
   tprice=oriprice+(oriprice*taxrate/100);
   printf("Total price after tax: %.2f\n", tprice);
   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.

CODE:

```
#include<stdio.h>
int main() {
   float hwage,hworked,wwages;
   printf("Enter the hourly wage : ");
   scanf("%f",&hwage);
   printf("Enter the number of hours worked : ");
   scanf("%f",&hworked);
   if (hworked<=30) {
      wwages=hwage*hworked;
   }
   else {
      wwages=(hwage*30)+((hwage*2)*(hworked-30));
   }
   printf("Weekly wages : %.2f\n",wwages);
```

```
    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.

CODE:

```
#include<stdio.h>
int main() {
    float tcost,amtpaid,amtreturned;
    float applecost=2.0*50.0;
    float mangocost=1.5*35.0;
    float potatocost=2.5*10.0;
    float tomatocost=1.0*15.0;
    tcost=applecost+mangocost+potatocost+tomatocost;
    amtpaid=500.0;
    amtreturned=amtpaid-tcost;
    printf("Total cost : Rs. %.2f\n",tcost);
    printf("Amount paid : Rs. %.2f\n",amtpaid);
    printf("Amount returned : Rs. %.2f",amtreturned);
    return 0;
}
```

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

CODE:

```
#include<stdio.h>
int main() {
    printf("Name : Adarsh Kumar Kushwaha\n");
    printf("Date of Birth: 08/02/2004\n");
    printf("Mobile Number: 9569737700\n");
    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.

CODE:

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

```
    }
    printf("Numbers in groups of three:\n");
    for (int i = 0; i < 9; i++) {
       printf("%d", numbers[i]);
          if ((i + 1) % 3 == 0) {
             printf(" , ");
             }
          else {
          printf(",");
          }
    }
    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

CODE:

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

CODE:

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

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

CODE:

```
#include<stdio.h>
int main() {
   float floatval;
   printf("Enter float value : ");
   scanf("%f",&floatval);
   printf("Value in exponential format : %.2e\n",floatval);
```

```
    return 0;
}
```

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

CODE:

```
#include<stdio.h>
int main() {
    long long int mnum;
    printf("Enter your 10-digit mobile number : ");
    scanf("%lld",&mnum);
    if (mnum>=1000000000 && mnum<=9999999999) {
        printf("You entered the mobile number: %lld\n",mnum);
    }
    else {
        printf("Invalid input.\nPlease 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)

CODE:

```
#include<stdio.h>
int main() {
    int ipop = 30000;
    float fyip = 20.0,syip = 30.0,pafy;
    pafy = ipop + (ipop * (fyip / 100));
    pafy = pafy + (pafy * (syip / 100));
    printf("Population after two years: %.0f\n",pafy);
    return 0;
}
```

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

CODE:

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

CODE:

```
#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("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.

CODE:

```
#include<stdio.h>
#include<math.h>
int main() {
   double xp,yp,xq,yq,slope,angle;
   printf("Enter the coordinates of point P (xp yp) : ");
   scanf("%lf %lf",&xp,&yp);
   printf("Enter the coordinates of point Q (xq yq) : ");
   scanf("%lf %lf",&xq,&yq);
   slope=(yq-yp)/(xq-xp);
   angle=atan(slope)*180/M_PI;
   printf("Slope of the line : %.2lf\n",slope);
   printf("Angle of inclination : %.2lf degrees\n",angle);
   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.

CODE:

```
#include<stdio.h>
int main() {
   float g1,g2,g3,g4,g5;
   float c1,c2,c3,c4,c5;
   printf("Enter grade points for each course (g1, g2, g3, g4, g5) : ");
```

```
    scanf("%f%f%f%f%f",&g1,&g2,&g3,&g4,&g5);
    printf("Enter credits for each course (c1, c2, c3, c4, c5) : ");
    scanf("%f%f%f%f%f",&c1,&c2,&c3,&c4,&c5);
    float num=(g1*c1)+(g2*c2)+(g3*c3)+(g4*c4)+(g5*c5);
    float deno=(c1+c2+c3+c4+c5);
    float spi=num/deno;
    printf("The Semester Performance Index (SPI) for 5 coarces is: %.2f\n",
spi);
    return 0;
}
```

Q15. Write a program to calculate the frequency (f) of a given wave with wavelength (λ) and speed (c), where c=λ*f.

CODE:

```
#include<stdio.h>
int main() {
    double wavelength,speed,frequency;
    printf("Enter the wavelength (in meters) : ");
    scanf("%lf",&wavelength);
    printf("Enter the speed of the wave (in meters per second) : ");
    scanf("%lf",&speed);
    frequency=speed/wavelength;
    printf("The frequency of the wave is %.2lf Hz\n",frequency);
    return 0;
}
```

Q16. 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]

CODE:

```
#include<stdio.h>
#include<math.h>
int main() {
    double u=30.0,a=5.0,s=70.0,v;
    v=sqrt(pow(u,2)+2*(a*s));
    printf("The final velocity of the car is %.2lf m/s\n", v);
    return 0;
}
```

Q17.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]

CODE:

```
#include<stdio.h>
int main() {
    double u = 0.0,a = 4.0,t = 3.0,v,s;
    //final velocity
    v = u + a * t;
```

```
    printf("The final velocity of the horse is %.2lf m/s\n", v);
    //distance travelled
    s = u * t + 0.5 * a * t * t;
    printf("The horse has traveled a distance of %.2lf meters\n", s);
    return 0;
}
```

Q18. Write a program to find the sum of your four last digit of your university roll number .

CODE:

```
#include <stdio.h>
int main() {
   int rollnum,sum=0;
   printf("Enter your university roll number: ");
   scanf("%d",&rollnum);
   int last4digt=(int)(rollnum % 10000);
   while(last4digt>0) {
      sum+=last4digt%10;
      last4digt/=10;
   }
   printf("The sum of the last four digits of your university roll number is:
%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**

CODE:

```
#include<stdio.h>
int main() {
float hgt_cm = 158.0;
float wgt_kg = 52.0;
double cm_to_feet = 0.0328084;
double kg_to_pounds = 2.20462;
double hgt_feet = hgt_cm * cm_to_feet;
double wgt_pounds = wgt_kg * kg_to_pounds;
printf("Your height is %.2f cm, which is %.2lf feet.\n", hgt_cm, hgt_feet);
printf("Your weight is %.2f kg, which is %.2lf pounds.\n", wgt_kg,
wgt_pounds);
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

CODE:

```
#include<stdio.h>
int main()
{
// a)
char option;
// b)
int sum = 0;
// c)
float product = 1.0;
return 0;
}
```

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

CODE:

```
#include<stdio.h>
int main() {
   int numbers[9];
   printf("Enter nine integers, separated by spaces:");
   for (int i = 0; i < 9; i++) {
      scanf("%d",&numbers[i]);
   }
   printf("Numbers in groups of three:\n");
   for (int i = 0; i < 9; i++) {
      printf("%d", numbers[i]);
         if ((i + 1) % 3 == 0) {
            printf(" , ");
            }
         else {
         printf(",");
         }
   }
   return 0;
}
```

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

ANS.

Header files in C programming are files containing declarations of functions, variables, and other constructs used in C programs. These declarations provide information about these constructs to the compiler, allowing it to understand how to properly compile and link the code. Header files in C programming are essential for organizing and maintaining code, enabling code reuse, and providing the necessary information to the compiler for correct compilation and linking of C programs.

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);
}
```

OUTPUT = 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);
 }
```

OUTPUT = GLA UNIVERSITY14

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

ANS.

Library functions, also known as standard library functions or built-in functions, are predefined functions provided by programming language libraries or standard libraries. These functions perform common tasks and operations, and they are available for use in your programs without the need to implement them from scratch. In C programming, standard library functions are typically declared in header files and are part of the C Standard Library. Here are four commonly used C Standard Library functions:

1. **printf**: Found in <stdio.h>, this function is used for formatted output. It allows
you to print data to the standard output (usually the console) with various formatting options.
2. **scanf**: Also found in <stdio.h>, scanf is used for formatted input. It allows you to
read and store data from the standard input (usually the keyboard) based on specified format specifiers.
3. **strlen**: Found in <string.h>, strlen is used to calculate the length of a null-terminated character string (a string with a null character '\0' at the end).
4. **rand**: Found in <stdlib.h>, rand is used to generate pseudo-random numbers. It
allows you to generate random integers within a specified range.

Q26. What will be the output of following program?

```
#include <stdio.h>
void main()
{
  int x = printf("C is placement oriented Language") – printf("Hi");
```

```
  printf("%d %o %x", x,x,x);
}
```

OUTPUT = C is placement oriented LanguageHi23 23

Q27. What is the meaning of following statement?

printf(“%d”,scanf(“%d%d”,&a,&b));

ANS.

The statement printf("%d", scanf("%d%d", &a, &b)); will first execute scanf, which reads integers from the user, and then it will print the result (the number of successfully scanned items) using printf. The printed result will be either 0, 1, or 2, depending on how many integers the user successfully entered and were stored in a and b.

Q28. What will be the output of following program?

```
#include <stdio.h>
void main()
{
  printf(" \"C %% FOR %% PLACEMENT\"");
}
```

OUTPUT = "C % FOR % PLACEMENT"

Q29. Suppose distance between GLA University and Delhi is m km (to be entered by user), by BUS you can reach Delhi in 4 hours. Develop a ‘C’ program to calculate speed of bus.

CODE:

```
#include<stdio.h>
int main() {
   double distance, time, speed;
   printf("Enter the distance between GLA University and Delhi (in
kilometers) : ");
   scanf("%lf",&distance);
   time=4.0;
   speed=distance/time;
   printf("The speed of the bus is %.2lf km/h\n", speed);
   return 0;
}
```

Q30. In an exam Satyam got 50 marks, Suman got 70 marks and Shyam got 80 marks, Write a ‘C’ program to find average marks of these three participants.

CODE:

```
#include<stdio.h>
int main() {
   int satyammarks= 50,sumanmarks = 70,shyammarks = 80;
   int totalmarks= satyammarks + sumanmarks + shyammarks;
   double averagemarks= (double)totalmarks / 3;
   printf("The average marks of Satyam, Suman and Shyam are: %.2lf\n",
averagemarks);
```

```
    return 0;
}
```

Q31. One day, Mohan called Saurav and Sajal and gave some money to them, later he realized that money that was given to Saurav should be given to Sajal and vice-versa. Develop a 'C' program to help Mohan so that he can rectify his mistake.

CODE:

```
#include<stdio.h>
int main() {
    double sauravmoney, sajalmoney, temp;
    printf("Enter the amount given to Saurav: ");
    scanf("%lf", &sauravmoney);
    printf("Enter the amount given to Sajal: ");
    scanf("%lf", &sajalmoney);
    temp = sauravmoney;
    sauravmoney = sajalmoney;
    sajalmoney = temp;
    printf("After correction:\n");
    printf("Amount given to Saurav: %.2lf\n", sauravmoney);
    printf("Amount given to Sajal: %.2lf\n", sajalmoney);
    return 0;
}
```

Q32. One day when I was going for a lunch, suddenly rain started, I was very hungry so started running with speed of 4km/h and it took 3 min to reach mess. Help me to develop a 'C' program to calculate distance travelled by me.

CODE:

```
#include <stdio.h>
int main() {
float speed = 4.0;
float timemin = 3.0;
float timehrs = timemin / 60.0;
float distance;
distance = speed * timehrs;
printf("Distance traveled: %.2f km\n", distance);
return 0;
}
```

Q33. Can two or more escape sequences such as \n and \t be combined in a single line of program code?

ANS.

Yes, you can combine multiple escape sequences in a single line of program code in languages like C and C++. Escape sequences are special character combinations that are used to represent non-printable characters or to format the output.

For example,

```
#include <stdio.h>
int main() {
printf("This is a line with a newline (\n) and a tab (\t) for formatting.\n");
return 0;
}
```

Q34. What are comments and how do you insert it in a C program?

ANS.

Comments in a C program are annotations or explanatory notes that are ignored by the compiler. They are used to provide information, explanations, or documentation within the source code to make it more understandable to humans. Comments are not executed as part of the program and do not affect the program's functionality.

```
// This is a single-line comment
int x = 10; // This is a comment after code
/* This is a
multi-line comment */
int y = 20;
```

Q35. What is wrong in this statement? scanf(“%d”,number);

ANS.

The statement scanf("%d", number); has an issue with the way the scanf function is used. The issue is with the way the number variable is passed as an argument to scanf. In C, when you use scanf to read input and store it in a variable, you should pass the address of the variable using the & (address-of) operator. Here's the corrected statement:

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

Q36. What will be the output?

```
#include <stdio.h>
  int main()
{
  if (sizeof(int) > -1)
    printf("Yes");
  else
    printf("No");
  return 0;
}
```

OUTPUT = YES

Q37. Point out which of the following variable names are invalid:
gross-salary INTEREST , salary of emp , avg. , thereisbookinmysoup

ANS.

gross-salary - Variable names in C cannot contain hyphens (-). You should use underscores (_) or alphanumeric characters.

avg. - Variable names cannot contain a period (.) character. You should use underscores (_) or alphanumeric characters.

Q38. Tom works at an aquarium shop on Saturdays. One Saturday, when Tom gets to work, he is asked to clean a 175-gallon reef tank. His first job is to drain the tank. He puts a hose into the tank and starts a siphon. Tom wonders if the tank will finish draining before he leaves work. He measures the amount of water that is draining out and finds that 12.5 gallons drain out in 30 minutes. So, he figures that the rate is 25 gallons per hour. Develop a 'C' program to help Tom to calculate time required to completely clean tank.

CODE:

```
#include <stdio.h>
int main() {
float tankcapacity = 175.0;
float drainrate = 25.0;
float timerequired;
timerequired = tankcapacity / drainrate;
printf("Time required to completely clean the tank: %.2f
hours\n",timerequired);
return 0;
}
```

Q39. The percent y (in decimal form) of battery power remaining x hours after you turn on a laptop computer is $y = -0.2 x + 1$. Develop a 'C' program to calculate after how many hours the battery power is at 75%?

CODE:

```
#include <stdio.h>
int main() {
float batterypower = 0.75;
float hours;
hours = (1 - batterypower) / (-0.2);
printf("After %.2f hours, the battery power is at 75%%.\n", hours);
return 0;
}
```

Q40. Which of the following is used to convert the high level language in machine language in a single go?

a. Compiler b.Interpreter
c. Linker d.Assembler

ANS.

Compiler

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

a.%0 b.%d
c. %o d. %e

ANS.

%o

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

a. %e b.%.2f
c. %f d.%.2e

ANS.

%.2e

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

a. char
b. array
c. float
d. int

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);
}
```

a. hello7 b. "hello"7
c. "hell"8 d. hell8

ANS.

"hello"7

Q 45. What is the output of following code?

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

a. 5, 5 b. 5, 5.000000
c. Garbage, 5.000000 d. Garbage, 5

ANS.

Garbage, 5

Q46. Which of the following is an identifier?

a. &fact b. Basic_pay
c. enum d. 1sum

ANS.

Basic_pay,enum

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);
}
```

a. c1 b. cgarbage

c. 1 c. c

OUTPUT = 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) $(365.55)_{10} = (101101101.011)_2$
b) $(453.65)_{10} = (750.16)_8$
c) $(5164.12)_{10} = (220CE.E7)_{16}$
d) $(23.65)_{10} = (43.131)_5$
e) $(772)_{10} = (2152)_7$

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) $(325.54)_6$ = 125.9444… in decimal (approximately)
b) $(1001010110101.1110101)_2$ = 8193.9990234375 in decimal.
c) $(742.72)_8$ = 482.125 in decimal.
d) $(AC94.C5)_{16}$ = 44280.9453125 in decimal.

Q50. Perform the following conversion from Hexadecimal to other number as directed-

$(DB56.CD4)_{16} = (?)_2, \ (?)_8, \ (?)_4$

ANS.

BINARY = (1101101101010110.110011010100),
OCTAL = (666536.634),
QUATERNARY (Base 4) = (312311023300)

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

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

ANS.

BINARY = (1001110011),
DECIMAL = (307),
HEXADECIMAL = (13B),
BASE-5 = (3213)

Q52. Find the value of A?

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

ANS.

a) A = 16
b) A = 13
c) A = 5 or A = -5

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 range of a 16-bit signed integer in C is typically from -32,768 to 32,767. Therefore, attempting to store 32770 in a 16-bit signed integer will result in an overflow.

Q54: What will be the output of following program?

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

OUTPUT = Temperature in Fahrenheit is 41.00