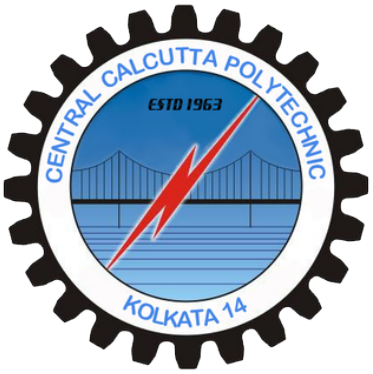

CENTRAL CALCUTTA POLYTECHNIC

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DEPT. : COMPUTER SCIENCE AND TECHNOLOGY

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- SUBJECT : PROGRAMMING IN C
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For next 100 units Rs. 1.20/unit
For unit above 250 Rs. 1.50/unit
An additional surcharge of 20% is added to the bill. . . . 24

1 If Else

1.1 Write a C program to find maximum between two numbers.

Source Code :

```c
#include <stdio.h>

int main()
{
  int a, b;
  printf("*** Enter 2 integers to compare ***\n");
  printf("First integer => ");
  scanf("%d", &a);
  printf("Second integer => ");
  scanf("%d", &b);

  a > b ? printf("Max is %d\n", a) : printf("Max is %d\n", b);

  return 0;
}
```

Program Output :

```
assignment/programs on  main [?] too
➜ gcc A02_P01.c -lm && ./a.out
*** Enter 2 integers to compare ***
First integer => 23
Second integer => 56
Max is 56
```

1.2 Write a C program to find maximum between three numbers.

Source Code :

```c
#include <stdio.h>

int main()
{
  int a, b, c;
  printf("*** Enter 3 integers to compare ***\n");
  printf("First integer => ");
  scanf("%d", &a);
  printf("Second integer => ");
  scanf("%d", &b);
  printf("Third integer => ");
  scanf("%d", &c);

  if (a > b && a > c)
  {
    printf("Max is %d\n", a);
  }
  else if (b > a && b > c)
  {
    printf("Max is %d\n", b);
  }
  else
  {
    printf("Max is %d\n", c);
  }

  return 0;
}
```

Program Output :

```
assignment/programs on  main [?] took 3s
➜ gcc A02_P02.c -lm && ./a.out
*** Enter 3 integers to compare ***
First integer => 12
Second integer => 19
Third integer => 15
Max is 19
```

1.3 Write a C program to check whether a number is negative, positive or zero.

Source Code :

```c
#include <stdio.h>

int main()
{
  int a;
  printf("Enter a number to check => ");
  scanf("%d", &a);

  if (a > 0)
  {
    printf("%d is positive.\n", a);
  }
  else if (a < 0)
  {
    printf("%d is negative.\n", a);
  }
  else
  {
    printf("Its a zero.\n");
  }

  return 0;
}
```

Program Output :

```
assignment/programs on  main [?] took 2s
➜ gcc A02_P03.c -lm && ./a.out
Enter a number to check => -23
-23 is negative.
```

1.4 Write a C program to check whether a number is divisible by 5 and 11 or not.

Source Code :

```c
#include <stdio.h>

int main()
{
  int a;
  printf("Enter a number to check => ");
  scanf("%d", &a);

  if (a % 5 == 0)
  {
    printf("%d is divisible by 5.\n", a);
  }
  else if (a % 11 == 0)
  {
    printf("%d is divisible by 11.\n", a);
  }
  else
  {
    printf("%d is not divisible by both 5 and 11.\n");
  }

  return 0;
}
```

Program Output :

```
assignment/programs on  main [?] took 6s
➜ gcc A02_P04.c -lm && ./a.out
Enter a number to check => 55
55 is divisible by 5.
```

1.5 Write a C program to check whether a number is even or odd.

Source Code :

```c
#include <stdio.h>

int main()
{
  int a;
  printf("Enter a number to check => ");
  scanf("%d", &a);
  if (a == 0)
  {
    printf("0 is invalid.");
    return 1;
  }

  printf(a % 2 == 0 ? "%d is even\n" : "%d is odd\n", a);

  return 0;
}
```

Program Output :

```
assignment/programs on  main [?]
➜ gcc A02_P05.c -lm && ./a.out
Enter a number to check => 12
12 is even
```

1.6 Write a C program to check whether a year is leap year or not.

Source Code :

```c
#include <stdio.h>

int main()
{
  int a;
  printf("Enter a year (4 digit) => ");
  scanf("%d", &a);

  if (a % 100 == 0)
  {
    if (a % 400 == 0)
    {
      printf("%d is a century and a leap year.\n", a);
    }
    else
    {
      printf("%d is not a leap year or invalid.\n", a);
    }
  }
  else if (a % 4 == 0)
  {
    printf("%d is a leap year.\n", a);
  }
  else
  {
    printf("%d is not a leap year or invalid.\n", a);
  }

  return 0;
}
```

Program Output :

```
assignment/programs on  main [?] took 7s
➜ gcc A02_P06.c -lm && ./a.out
Enter a year (4 digit) => 1563
1563 is not a leap year or invalid.

assignment/programs on  main [?] took 22s
➜ gcc A02_P06.c -lm && ./a.out
Enter a year (4 digit) => 2000
2000 is a leap year.
```

1.7 Write a C program to check whether a character is alphabet or not.

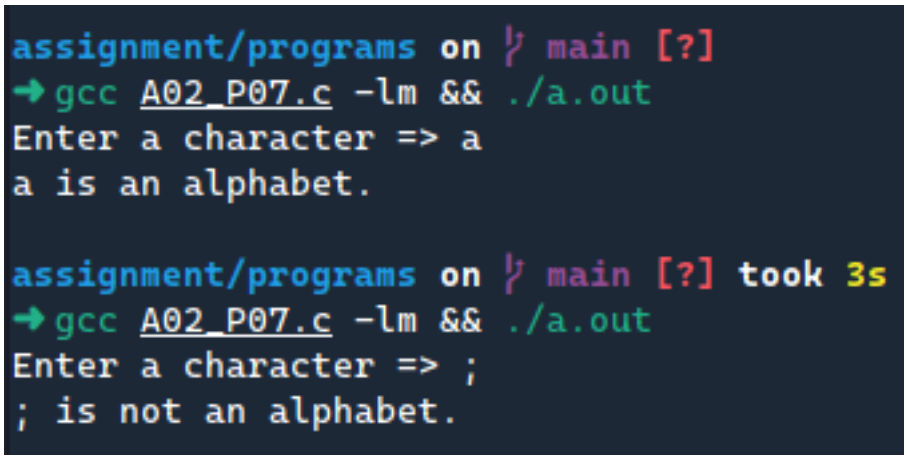
Source Code :

```c
#include <stdio.h>

int main()
{
  char x;
  printf("Enter a character => ");
  scanf("%c", &x);

  if ((x >= 65 && x <= 90) || (x >= 97 && x <= 122))
  {
          printf("%c is an alphabet.\n", x);
  }
  else
  {
          printf("%c is not an alphabet.\n", x);
  }
  return 0;
}
```

Program Output :



1.8 Write a C program to input any alphabet and check whether it is vowel or consonant.

Source Code :

```c
#include <stdio.h>

int main()
{
  char a;
  printf("Enter a letter => ");
  scanf("%c", &a);

  switch(a)
  {
    // uppercase vowels
    case 65:
    case 69:
    case 73:
    case 79:
    case 85:
    // lowercase vowels
    case 97:
    case 101:
    case 105:
    case 111:
    case 117:
      printf("%c is vowel.\n", a);
      break;
    default:
      printf("%c is consonent.\n", a);
  }

  return 0;
}
```

Program Output :

```
assignment/programs on  main [?]
➜ gcc A02_P08.c -lm && ./a.out
Enter a letter => o
o is vowel.

assignment/programs on  main [?] took 4s
➜ gcc A02_P08.c -lm && ./a.out
Enter a letter => x
x is consonent.
```

1.9 Write a C program to input any character and check whether it is alphabet, digit or special character.

Source Code :

```c
#include <stdio.h>

int main(int argc, char const *argv[])
{
        char x;
  printf("Enter a character => ");
  scanf("%c", &x);

        if ((x >= 65 && x <= 90) || (x >= 97 && x <= 122))
  {
          printf("%c is an alphabet.\n", x);
  }
  else if(x >= 48 && x<= 57)
  {
          printf("%c is a number.\n", x);
  }
        else
  {
          printf("%c is a spcial character.\n", x);
  }
        return 0;
}
```

Program Output :

```
assignment/programs on  main [?] took 3s
➜ gcc A02_P09.c -lm && ./a.out && ./a.out && ./a.out
Enter a character => d
d is an alphabet.
Enter a character => 6
6 is a number.
Enter a character => '
' is a spcial character.
```

1.10 Write a C program to check whether a character is uppercase or lowercase alphabet.

Source Code :

```c
#include <stdio.h>

int main(int argc, char const *argv[])
{
  char x;
  printf("Enter an alphabet => ");
  scanf("%c", &x);

  if (x >= 65 && x <= 90)
  {
    printf("%c is uppercase.\n", x);
  }
  else if (x >= 97 && x <= 122)
  {
    printf("%c is lowercase.\n", x);
  }
  else
  {
    printf("%c is invalid.\n", x);
  }
  return 0;
}
```

Program Output :

```
assignment/programs on  main [?]
➜ gcc A02_P10.c -lm && ./a.out && ./a.out
Enter an alphabet => F
F is uppercase.
Enter an alphabet => k
k is lowercase.
```

1.11 Write a C program to input week number and print week day.

Source Code :

```c
#include <stdio.h>

int main(int argc, char const *argv[])
{
  int x;
  printf("Enter a weekday number => ");
  scanf("%d", &x);

  switch (x)
  {
  case 1:
    printf("Sunday\n");
    break;
  case 2:
    printf("Monday\n");
    break;
  case 3:
    printf("Tuesday\n");
    break;
  case 4:
    printf("Wednesday\n");
    break;
  case 5:
    printf("Thursday\n");
    break;
  case 6:
    printf("Friday\n");
    break;
  case 7:
    printf("Saturday\n");
    break;
  default:
    printf("Invalid Input.\n");
  }

  return 0;
}
```

Program Output :

```
assignment/programs on  main [?] took 4s
➜ gcc A02_P11.c -lm && ./a.out && ./a.out
Enter a weekday number => 5
Thursday
Enter a weekday number => 12
Invalid Input.
```

1.12 Write a C program to input month number and print number of days in that month.

Source Code :

```c
#include <stdio.h>

int main()
{
  int x;
  printf("Enter month number => ");
  scanf("%d", &x);

  switch (x)
  {
  case 1:
  case 3:
  case 5:
  case 7:
  case 8:
  case 10:
  case 12:
    printf("There are 31 days in %s\n", x == 1 ? "January" : x == 3 ? "March" : x == 5 ?
    ↪  "May" : x == 7 ? "July" : x == 8 ? "August" : x == 10 ? "October" : "December");
    break;
  case 4:
  case 6:
  case 9:
  case 11:
    printf("There are 30 days in %s\n", x == 4 ? "April" : x == 6 ? "June" : x == 9 ?
    ↪  "September" : "November");
    break;
  case 2:
    printf("There are 28 days in %s\n", "February");
    break;

  default:
    printf("Invalid Input.\n");
    break;
  }
  return 0;
}
```

Program Output :

```
assignment/programs on  main [?] took 27s
➜ gcc A02_P12.c -lm && ./a.out && ./a.out && ./a.out
Enter month number => 5
There are 31 days in May
Enter month number => 2
There are 28 days in February
Enter month number => 11
There are 30 days in November
```

1.13 Write a C program to count total number of notes in given amount.

Source Code :

```c
#include <stdio.h>

int main()
{
  int x;
  printf("Enter amount to count => ");
  scanf("%d", &x);

  int n_2000 = 0, n_500 = 0, n_200 = 0, n_100 = 0, n_50 = 0, n_20 = 0, n_10 = 0, n_5 = 0,
  ↪  n_2 = 0, n_1 = 0;

  if (x >= 2000)
  {
    n_2000 = x / 2000;
    x = x % 2000;
  }
  if (x >= 500)
  {
    n_500 = x / 500;
    x = x % 500;
  }
  if (x >= 200)
  {
    n_200 = x / 200;
    x = x % 200;
  }
  if (x >= 100)
  {
    n_100 = x / 100;
    x = x % 100;
  }
  if (x >= 50)
  {
    n_50 = x / 50;
    x = x % 50;
  }
  if (x >= 20)
  {
    n_20 = x / 20;
    x = x % 20;
  }
  if (x >= 10)
  {
    n_10 = x / 10;
    x = x % 10;
  }
  if (x >= 5)
  {
    n_5 = x / 5;
    x = x % 5;
  }
  if (x >= 2)
  {
    n_2 = x / 2;
    x = x % 2;
  }
```

```c
  if (x = 1)
  {
    n_1 = x;
  }

  printf("Number of notes => \n");
  printf("Notes of Rs. 2000 => %d\n", n_2000);
  printf("Notes of Rs. 500 => %d\n", n_500);
  printf("Notes of Rs. 200 => %d\n", n_200);
  printf("Notes of Rs. 100 => %d\n", n_100);
  printf("Notes of Rs. 50 => %d\n", n_50);
  printf("Notes of Rs. 20 => %d\n", n_20);
  printf("Notes of Rs. 10 => %d\n", n_10);
  printf("Notes of Rs. 5 => %d\n", n_5);
  printf("Notes of Rs. 2 => %d\n", n_2);
  printf("Notes of Rs. 1 => %d\n", n_1);

  return 0;
}
```

Program Output :

```
assignment/programs on  main [?] took 23s
➜ gcc A02_P13.c -lm && ./a.out
Enter amount to count => 5623
Number of notes =>
Notes of Rs. 2000 => 2
Notes of Rs. 500 => 3
Notes of Rs. 200 => 0
Notes of Rs. 100 => 1
Notes of Rs. 50 => 0
Notes of Rs. 20 => 1
Notes of Rs. 10 => 0
Notes of Rs. 5 => 0
Notes of Rs. 2 => 1
Notes of Rs. 1 => 1
```

1.14 Write a C program to input angles of a triangle and check whether triangle is valid or not.

Source Code :

```c
#include <stdio.h>

int main()
{
  int a, b, c;
  printf("Enter 1st angle => ");
  scanf("%d", &a);
  printf("Enter 2nd angle => ");
  scanf("%d", &b);
  printf("Enter 3rd angle => ");
  scanf("%d", &c);

  if (a + b + c == 180 && a != 0 && b != 0 && c != 0)
  {
    printf("Triangle is valid.\n");
  }
  else
  {
    printf("Triangle is invalid.\n");
  }

  return 0;
}
```

Program Output :

```
assignment/programs on  main [?] took 4s
➜ gcc A02_P14.c -lm && ./a.out
Enter 1st angle => 30
Enter 2nd angle => 56
Enter 3rd angle => 102
Triangle is invalid.

assignment/programs on  main [?] took 43s
➜ gcc A02_P14.c -lm && ./a.out
Enter 1st angle => 30
Enter 2nd angle => 60
Enter 3rd angle => 90
Triangle is valid.
```

1.15 Write a C program to input all sides of a triangle and check whether triangle is valid or not.

Source Code :

```c
#include <stdio.h>

int main()
{
  int a, b, c;
  printf("Enter 1st side => ");
  scanf("%d", &a);
  printf("Enter 2nd side => ");
  scanf("%d", &b);
  printf("Enter 3rd side => ");
  scanf("%d", &c);

  if ((a + b) > c && (b + c) > a && (a + c) > b)
  {
    printf("Triangle is valid.\n");
  }
  else
  {
    printf("Triangle is invalid.\n");
  }

  return 0;
}
```

Program Output :

```
assignment/programs on  main [?]
➜ gcc A02_P15.c -lm && ./a.out
Enter 1st side => 10
Enter 2nd side => 26
Enter 3rd side => 16
Triangle is invalid.

assignment/programs on  main [?]
➜ gcc A02_P15.c -lm && ./a.out
Enter 1st side => 5
Enter 2nd side => 7
Enter 3rd side => 3
Triangle is valid.
```

1.16 Write a C program to check whether the triangle is equilateral, isosceles or scalene triangle.

Source Code :

```c
#include <stdio.h>

int main()
{
  int a, b, c;
  printf("Enter 1st side => ");
  scanf("%d", &a);
  printf("Enter 2nd side => ");
  scanf("%d", &b);
  printf("Enter 3rd side => ");
  scanf("%d", &c);

  if (a == b && b == c)
  {
    printf("Triangle is equilateral.\n");
  }
  else if (a == b || a == c || b == c)
  {
    printf("Triangle is isosceles.\n");
  }
  else
  {
    printf("Triangle is scalene.\n");
  }

  return 0;
}
```

Program Output :

```
assignment/programs on  main [?] took 5s
➜ gcc A02_P16.c -lm && ./a.out && ./a.out && ./a.out
Enter 1st side => 10
Enter 2nd side => 10
Enter 3rd side => 10
Triangle is equilateral.
Enter 1st side => 12
Enter 2nd side => 10
Enter 3rd side => 12
Triangle is isosceles.
Enter 1st side => 12
Enter 2nd side => 13
Enter 3rd side => 14
Triangle is scalene.
```

1.17 Write a C program to find all roots of a quadratic equation.

Source Code :

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

int main()
{
  int a, b, c;
  float d;
  printf("Syntax of quadratic eq. is ax2 + bx + c = 0\n");
  printf("Enter the value of coefficient a => ");
  scanf("%d", &a);
  printf("Enter the value of coefficient b => ");
  scanf("%d", &b);
  printf("Enter the value of coefficient c => ");
  scanf("%d", &c);

  d = (b * b) - (4 * a * c);

  if (d > 0)
  {
    float r1 = (-b + sqrt(d)) / 2 * a;
    float r2 = (-b - sqrt(d)) / 2 * a;
    printf("First root = %.2f\n", r1);
    printf("Second root = %.2f\n", r2);
  }
  else if (d == 0)
  {
    float r1 = -b / 2 * a;
    float r2 = -r1;
    printf("First Root = %.2f\n", r1);
    printf("Second Root = %.2f\n", r2);
  }
  else
  {
    // emulating complex number
    float b_f = -b / 2 * a;
    // printf("a: %d, b: %d, c: %d\nb_f: %f", a, b, c, b / (2 * a));
    float r_f = sqrt(-d) / (2 * a);
    printf("First root = %.2f + i%.2f\n", b_f, r_f);
    printf("Second root = %.2f - i%.2f\n", b_f, r_f);
  }

  return 0;
}
```

Program Output :

```
➜ gcc A02_P17.c -lm && ./a.out
Syntax of quadratic eq. is ax2 + bx + c = 0
Enter the value of coefficient a => 9
Enter the value of coefficient b => 6
Enter the value of coefficient c => 15
First root = -27.00 + i1.25
Second root = -27.00 - i1.25
```

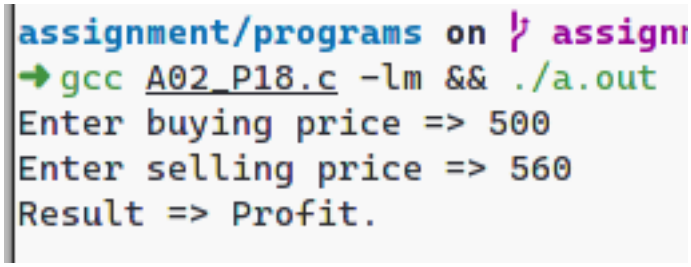
1.18 Write a C program to calculate profit or loss.

Source Code :

```c
#include <stdio.h>

void main()
{
  int buy, sell;
  printf("Enter buying price => ");
  scanf("%d", &buy);
  printf("Enter selling price => ");
  scanf("%d", &sell);
  printf("Result => ");
  if (sell - buy > 0)
    printf("Profit.\n");
  else if (sell - buy < 0)
    printf("Loss.\n");
  else
    printf("Neither profit nor loss.\n");
}
```

Program Output :



1.19 Write a C program to input marks of five subjects Physics, Chemistry, Biology, Mathematics and Computer. Calculate percentage and grade according to following:

$Percentage >= 90\% : Grade A$
$Percentage >= 80\% : Grade B$
$Percentage >= 70\% : Grade C$
$Percentage >= 60\% : Grade D$
$Percentage >= 40\% : Grade E$
$Percentage < 40\% : Grade F$

Source Code :

```c
#include <stdio.h>

int main()
{
  int phys, chem, bios, math, comp;
  printf("Full Marks for each subject is 100.\n");
  printf("Enter marks of Physics => ");
  scanf("%d", &phys);
  printf("Enter marks of Chemistry => ");
  scanf("%d", &chem);
  printf("Enter marks of Biology => ");
  scanf("%d", &bios);
  printf("Enter marks of Mathematics => ");
  scanf("%d", &math);
  printf("Enter marks of Computer => ");
  scanf("%d", &comp);

  float avg = (phys + chem + bios + math + comp) / 5;

  printf("Result:\n");
  printf("Percentage: %.2f%\n", avg);
  printf("Grade: %s\n", avg >= 90 ? "A" : avg >= 80 ? "B" : avg >= 70 ? "C" : avg >= 60 ?
  ↪  "D" : avg >= 40 ? "E" : "F");
  return 0;
}
```

Program Output :

```
assignment/programs on  main [?]
➜ gcc A02_P19.c -lm && ./a.out
Full Marks for each subject is 100.
Enter marks of Physics => 59
Enter marks of Chemistry => 68
Enter marks of Biology => 35
Enter marks of Mathematics => 46
Enter marks of Computer => 73
Result:
Percentage: 56.00%
Grade: E
```

1.20 Write a C program to input basic salary of an employee and calculate its Gross salary according to following:

$BasicSalary <= 10000 : HRA = 20\%, DA = 80\%$
$BasicSalary <= 20000 : HRA = 25\%, DA = 90\%$
$BasicSalary > 20000 : HRA = 30\%, DA = 95\%$

Source Code :

```c
#include <stdio.h>
int main()
{
  int basic, hra, da, gross;
  printf("Enter basic salary => ");
  scanf("%d", &basic);
  if (basic <= 10000)
  {
    hra = basic * 0.2;
    da = basic * 0.8;
    gross = basic + hra + da;
  }
  else if (basic <= 20000)
  {
    hra = basic * 0.25;
    da = basic * 0.9;
    gross = basic + hra + da;
  }
  else if (basic > 20000)
  {
    hra = basic * 0.3;
    da = basic * 0.95;
    gross = basic + hra + da;
  }
  printf("Gross Salary => %d\n", gross);
  return 0;
}
```

Program Output :

```
assignment/programs on  main [
➜ gcc A02_P20.c -lm && ./a.out
Enter basic salary => 18000
Gross Salary => 38700
```

1.21 Write a C program to input electricity unit charges and calculate total electricity bill according to the given condition:
For first 50 units Rs. 0.50/unit
For next 100 units Rs. 0.75/unit
For next 100 units Rs. 1.20/unit
For unit above 250 Rs. 1.50/unit
An additional surcharge of 20% is added to the bill.

Source Code :

```c
#include <stdio.h>

int main()
{
  float units, cost;
  printf("Enter comsumed units => ");
  scanf("%f", &units);

  if (units <= 50)
  {
    cost = units * 0.50;
  }
  else if (units <= 150)
  {
    cost = (50 * 0.50) + ((units - 50) * 0.75);
  }
  else if (units <= 250)
  {
    cost = (50 * 0.50) + (100 * 0.75) + ((units - 150) * 1.20);
  }
  else
  {
    cost = (50 * 0.50) + (100 * 0.75) + (100 * 1.20) + ((units - 250) * 1.50);
  }

  cost = cost * 120 / 100;

  printf("Total Cost: %.2f\n", cost);

  return 0;
}
```

Program Output :

```
assignment/programs on  main [?] t
➜ gcc A02_P21.c -lm && ./a.out &&
Enter comsumed units => 63
Total Cost: 41.70
Enter comsumed units => 450
Total Cost: 624.00
Enter comsumed units => 165
Total Cost: 141.60
```