Name of the Examination: First Semester End Semester Examination
Name of the Subject: Introduction to Computing
Subject Code: CS1101
Date of Examination: 5th April, 2021.
Name of the Student: Tathagata Ghosh
Examination Roll Number: 20201TB065
G Suite ID: 20201TB065.tathagata@students.iiests.ac.in
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Group - 'A'

Ans 1 a) i) $(642.53)_{10}$

Integral part,

8	642	2
8	80	0
8	10	2
8	1	1
	0	

Fractional Part,

$0.53 \times 8 = 4.24$ → 4
$0.24 \times 8 = 1.92$ → 1
$0.92 \times 8 = 7.36$ → 7
$0.36 \times 8 = 2.88$ → 2

$(642.53)_{10} = (1202.41)_8$

ii) $(732.413)_8$

$(7)_{10} = (111)_2$
$(3)_{10} = (011)_2$
$(2)_{10} = (010)_2$
$(4)_{10} = (100)_2$
$(1)_{10} = (001)_2$
$(3)_{10} = (011)_2$

$(732.413)_8 = (111\ 011\ 010.100\ 001\ 011)_2$

$= (0001\ 1101\ 1010.1000\ 0101\ 1000)_2$

$= (1DA.858)_{16}$

$(732.413)_8 = (1DA.85)_{16}$

b) $F = x \oplus y = x'y + xy' = x'y + xy' + xx' + xy' = (x+y)(x'+y')$

Now, we need to implement this circuit using NAND gates.

$F = (x+y)(xy)' = x(xy)' + y(xy)'$

Take compliment

~~$F' = (x.(xy)' + y(xy)')' = (x.(xy)')'.(y.(xy)')'$~~

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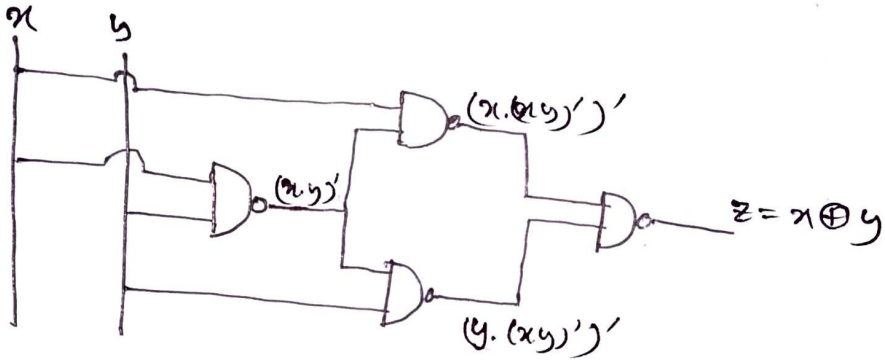
$$F' = (x.(xy)' + y(xy)')' = (x.(xy)')'.(y(xy)')$$

Take compliment again,

$$F = ((x.(xy)')'.(y.(xy)'))'$$

Now we can implement this using NAND gates,



minimum number of 2 input NAND gate required to realise 2-input XOR gate is 4.

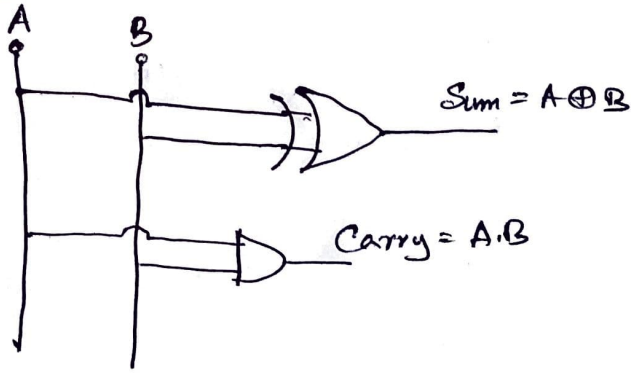
Ans 2) Half Adder: Add two bits and produces result (sum) and carry.

A	B	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Sum = $AB' + A'B$
= $A \oplus B$
Carry = $A.B$

▲ Truth Table for Half Adder

▶ Logic circuit diagram for half adder circuit



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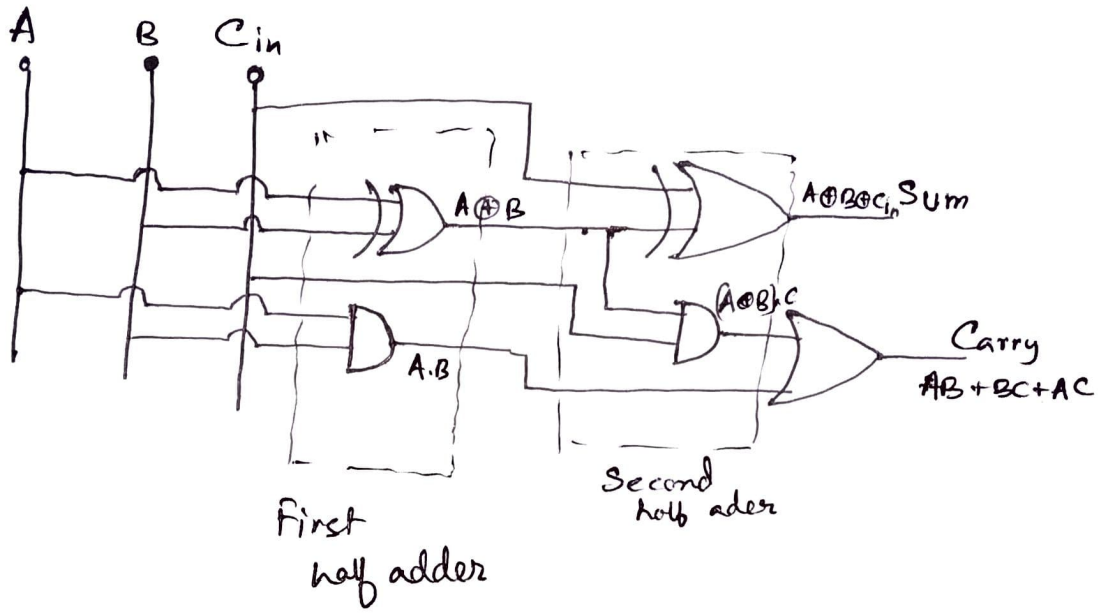
★ Logic circuit of full ~~add~~ adder using two half adders



A	B	C_{in}	Sum	Carry
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

▲ Truth Table for Full Adder

$$Sum = A \oplus B \oplus C_{in}$$
$$Cout = AB + BC + AC$$

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Group-B;

Ans 4a)

```
#include<stdio.h>
int main()
{
    int n;
    printf("Enter a number: ");
    scanf("%d", &n);
    int a[n-1];
    for (int i=n; i>1; i--)
    {
        a[i-2] = i;
    }
    for (int i=0; i<n; i++)
    {
        if (a[i]==0)
        {
            continue;
        }
        for (int j=1; j<n; j++)
        {
            if (i==j)
            {
                continue;
            }
            if ((a[j]%a[i])==0)
            {
                a[j] = 0;
            }
        }
    }
}
```

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```
    printf("The Prime numbers from 1 to %d are: ", n);
    for (int i=0; i<n; i++)
      {
        if (a[i]!=0)
          printf("%d", a[i]);
      }
    return 0;
}
```

b)
```
#include<stdio.h>
int main()
{
    int a[10];
    printf("Enter 10 numbers:\n");
     int i;
     for(i=0; i<10; i++)
      {
        scanf("%d", (a+i));
      }
      printf("The elements of the array in the reverse order:\n");
      for(i--; i>=0; i--)
        {
          printf("%d\n", *(a+i));
        }
      return 0;
    }
```

Ans5) a)
```
#include<stdio.h>
    int power(int x, int y)
     {
        if (y==1)
          {
            return x;
```

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```
    return  x* power (x, y-1);
}

int  main()
{
   printf (" Enter the base and the power respectively :");
    int  x, y;
    scanf ("%d %d", &x, &y);
     if (y == 0)
     {
        printf ("%d %d = %d \n", x, y, 1);
      }
     else if (y>0)
       {
          printf ("%d %d = %d \n", x, y, power (x,y));
       }
       else
         {
           printf (" Invalid Input");
         }
       return 0;
     }
```

b)
```
#include <stdio.h>
int fact(int n)
{
    if(n==1)
      {
        return 1;
      }
    return  n* fact(n-1);
}
```

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```
int main()
{
    int n;
    printf("Enter a number: ");
    scanf("%d", &n);
    printf("Factorial of %d is %d", n, fact(n));
    return 0;
}
```

Ans 7)

```
#include<stdio.h>
int main(int a[], int n)
{
    // here n=10
    printf("Array before sorting \n");
    for(int i=0; i<n; i++)
    {
        printf("%d", *(a+i));
    }
    //Bubble-sort
    for(int i=0; i<n-1; i++)
    {
        for(int j=0; j<(n-i-1); j++)
        {
            if(*(a+j) > *(a+j+1))// swapping
            { //if in wrong order
                *(a+j) = *(a+j) + *(a+j+1);
                *(a+j+1) = *(a+j) - *(a+j+1);
                *(a+j) = *(a+j) - *(a+j+1);
            }
```

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```
        }
    }
    printf("Array after sorting in ascending order:\n");
    for(int i=0; i<n; i++)
    {
        printf("%d\n", *(a+i));
    }
    return 0;
}
```

Ans6) #include <stdio.h>

```
int main()
{
    printf("Enter the number of rows and columns of 1st
     matrix respectively: \n");
    int n1, n2, n3;
    scanf("%d%d", &n1, &n2);
    printf("Enter the number of columns of 2nd matrix: \n");
    scanf("%d", &n3);
    printf("Enter the values in the 1st matrix: \n");
    int a[n1][n2],
    int b[n2][n3];
    for(int i=0; i<n1; i++)
    {
        for(int j=0; j<n2; j++)
        {
            scanf("%d", &a[i][j]);
        }
    }
```

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```
printf("Enter the values in the 2nd matrix: \n");
for(int i=0; i<n2; i++)
    {
        for(int j=0; j<n3; j++)
            {
                scanf("%d", &b[i][j]);
            }
    } printf("The 1st matrix: \n");
for(int i=0; i<n1; i++)
    {
        for(int j=0; j<n2; j++)
            {
                printf("%d\t", a[i][j]);
            } printf("\n");
    }
printf("The 2nd matrix: \n");
for(int i=0; i<n2; i++)
    {
        for(int j=0; j<n3; j++)
            {
                printf("%d\t", b[i][j]);
            }
            printf("\n");
    }
int c[n1][n3];
for(int i=0; i<n1; i++)
    {
        for(int j=0; j<n3; j++)
            { c[i][j]=0; }
    }
```

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```
for (int i=0; i<n1; i++)
    {
      for (int j= 0; j <n3; j++)
        {
          for (int k =0; k<n2; k++)
            {
              c [i] [j] += (a [i][k] * b [k] [j]);
            }
        }
    }
    printf ("The resultant matrix after multiplication : \n");
    for (int i =0; i<n1; i++)
      {
        for (int j= 0; j<n3; j++)
          {
            printf ("%d \t", c [i][j]);
          }
        printf ("\n");
      }
    return 0;
}
```

T. Ghosh