Lab Assignment 1

20CO203P – Digital Electronics and Computer Organization Lab

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Question 1:-

Write a program to convert one number from one base to another base. User will give three inputs:

1. Input number base
2. Number
3. Output number base

Python Program:

Function to convert Base to Decimal

```
def base2dec(num):
    if 20 >= base_input >= 11:      # If statement to seperate numbers with
base greater than 10
        dict = {"0": 0, "1": 1, "2": 2, "3": 3,
                "4": 4, "5": 5, "6": 6, "7": 7,
                "8": 8, "9": 9, "A": 10, "B": 11,
                "C": 12, "D": 13, "E": 14, "F": 15, "G": 16,
                "H": 17, "I": 18, "J": 19}# Define a dictionary to store
conversion values
        output = 0       # Declare a variable output whose value is
initially zero
        j = 1
        for term in num:      # For loop is used to traverse the digits of
the number
            output = output+dict[term]*(16**(len(num)-j))    # the number is
converted to the user defined radix
            j = j+1
        return output         # Output is returned
    else:                     # Else Statement for numbers with base less
than 10
        output = 0
        j = 1
        for i in num:
            if int(i)>base_input:        # Validation of the entered number
                print("Enter a valid Number")
```

```
            output = output+int(i)*(base_input**(len(num)-j))       # The
output is converted to the user defined base
            j = j+1
        return output          # Output is returned

# Function to convert Decimal to Base
out_rev = []                           # Declare an empty list to strore
output value
def dec2base(num):
    if 20 >= base_output >= 11:       # If statemenet to seperate numbers
with base greater than 10
        rem = num % base_output         # Remainder is calculated
        quotient = int(num/base_output)     # Quotient in calculated and
converted to int datatype
        if rem == 10:                       # Combination of If and Elif
statements for bases greater than 10
            rem = "A"
        elif rem == 11:
            rem = "B"
        elif rem == 12:
            rem = "C"
        elif rem == 13:
            rem = "D"
        elif rem == 14:
            rem = "E"
        elif rem == 15:
            rem = "F"
        elif rem == 16:
            rem = "G"
        elif rem == 17:
            rem = "H"
        elif rem == 18:
            rem = "I"
        elif rem == 19:
            rem = "J"
        out_rev.append(str(rem))          # remainder is appended to empty
list
        if quotient != 0:
            dec2base(quotient)            # Function recursion is used to
run the process again till the quotient is zero
        else:
            out_rev.reverse()             # String is reversed
            string = ''.join(out_rev)     # The datatype of output is
changed
            print("The result is:", string)
    else:                                 # Else statement for numbers with
base less than 10
        rem = num % base_output               # remainder is calculated and
stored in rem
        out_rev.append(rem)               # remainder is appended to the
list out_rev
        quotient = int(num/base_output)     # Quotient is calculated and
stored in quotient
        if quotient != 0:
            dec2base(quotient)            # Function recursion is used to
repeat the process till the quotient is zero
        else:
            out_rev.reverse()             # String is reversed
            x = 0
            for current_digit in out_rev:  # the string is converted to
integer datatype
```

```
            x = x*10+current_digit
        print("The result is:", x)      # The result is printed


number = input("Enter a number:")             # User defined input is taken
for the number
base_input = int(input("Enter the base of the entered number:"))    # User
defined input is taken for input base
base_output = int(input("Enter the base of the output:"))           # User
defined input is taken for output base
dec = base2dec(number)               # The number with any base is converted
to decimal using predefined function
dec2base(dec)                       # The decimal number is converted to the
user defined base using predefined function
```

Output:

```
Enter a number:7E7
Enter the base of the entered number:16
Enter the base of the output:2
The result is: 11111100111

Enter a number:7E7
Enter the base of the entered number:16
Enter the base of the output:8
The result is: 3747

Enter a number:2023
Enter the base of the entered number:10
Enter the base of the output:8
The result is: 3747
```

Question 2:-

write a program to add two number. Input for the program are two and their base output of the program will be addition in the given base.

Python Program:

```
# Function to number of any base to decimal

def base2dec(num):
    if 20 >= base >= 11:      #If statement to seperate numbers with base
greater than 10
        dict = {"0": 0, "1": 1, "2": 2, "3": 3,          #Define a
dictionary to store conversion values
                "4": 4, "5": 5, "6": 6, "7": 7,
                "8": 8, "9": 9, "A": 10, "B": 11,
                "C": 12, "D": 13, "E": 14, "F": 15, "G": 16,
                "H": 17, "I": 18, "J": 19}
        output = 0            # Declare a variable output whose value is
initially zero
        j = 1
        for term in num:    # For loop is used to traverse the digits of
the number
            output = output+dict[term]*(16**(len(num)-j))  # the number is
converted to the user defined radix
            j = j+1
        return output       # Output is returned
    else:                   # Else Statement for numbers with base less
than 10
        output = 0
        j = 1
        for i in num:
            if int(i) > base:     # Validation of the entered number
                print("Enter a valid Number")
            output = output+int(i)*(base**(len(num)-j))          # The
output is converted to the user defined base
            j = j+1
        return output            # Output is returned

# Function to convert decimal number to any base
out_rev = []                        # Declare an empty list to strore output
value
def dec2base(num):
    if base == 16:                  # If statemenet to seperate numbers with
base greater than 10
        rem = num % base              # Remainder is calculated
        quotient = int(num/base)    # Quotient in calculated and converted
to int datatype
        if rem == 10:               # Combination of If and Elif statements
for bases greater than 10
            rem = "A"
        elif rem == 11:
            rem = "B"
        elif rem == 12:
            rem = "C"
        elif rem == 13:
            rem = "D"
        elif rem == 14:
```

```
            rem = "E"
        elif rem == 15:
            rem = "F"
        out_rev.append(str(rem))     # remainder is appended to empty list
        if quotient != 0:
            dec2base(quotient)    # Function recursion is used to run the
process again till the quotient is zero
        else:
            out_rev.reverse()     # String is reversed
            string = ''.join(out_rev)    # The datatype of output is changed
            print(string)
    else:                         # Else statement for numbers with base
less than 10
        rem = num % base              # remainder is calculated and stored
in rem
        out_rev.append(rem)       # remainder is appended to the list
out_rev
        quotient = int(num/base)    # Quotient is calculated and stored in
quotient
        if quotient != 0:
            dec2base(quotient)    # Function recursion is used to repeat the
process till the quotient is zero
        else:
            out_rev.reverse()     # String is reversed
            x = 0
            for current_digit in out_rev:     # the string is converted to
integer datatype
                x = x*10+current_digit
            print(x)                          # The result is printed


num1 = input("Enter first number:")              # User input is taken for
the first number
num2 = input("Enter second number:")             # User input is taken for
the second number
base = int(input("Enter the base of the numbers:"))   # User input is taken
for the base
num3 = base2dec(num1)+base2dec(num2)             # The numbers are converted
to decimal and added
dec2base(num3)                                  # the numbers are converted
back to users required base
```

Output:

```
Enter first number:3747
Enter second number:2653
Enter the base of the numbers:8
6622


Enter first number:123
Enter second number:23
Enter the base of the numbers:4
212
```