1. NUMBER SYSTEM

Q.) Create a menu driven program to convert a decimal number to it's binary, octal, and hexagonal equivalents.

INPUT

```
def D_t_B():
    a=int( input('Enter Decimal Number: ') )
    q=a
    l=[]
    s=''
    while q>0:
        (q,r)=(q//2,q%2)
        l.append(r)
    l.reverse()
    for i in range(len(l)):
        s=s+str(l[i])
    return f'\t\t\t ({a}){chr(0x2081)}{chr(0x2080)} = ({s}){chr(0x2082)}\n'

def D_t_O():
    a=int( input('Enter Decimal Number: ') )
    q=a
    l=[]
    s=''
    while q>0:
        (q,r)=(q//8,q%8)
        l.append(r)
    l.reverse()
    for i in range(len(l)):
        s += str(l[i])
    return f'\t\t\t ({a}){chr(0x2081)}{chr(0x2080)} = ({s}){chr(0x2088)}\n'

def D_t_H():
    a=int( input('Enter Decimal Number: ') )
    q=a
    l=[]
    s=''
    while q>0:
        (q,r)=(q//16,q%16)
        l.append(r)
    l.reverse()
```

```
    d={10:'A',11:'B',12:'C',13:'D',14:'E',15:'F'}
    for i in range(len(l)):
        if l[i]>9:
            s += str(d[l[i]])
        else:
            s += str(l[i])
    return f'\t\t\t ({a}){chr(0x2081)}{chr(0x2080)} = ({s}){chr(0x2081)}{chr(0x2086)}\n'

def Menu():
    while True:
        print('\t\t\t -----------------------')
        print('\t\t\t   DATA REPRESENTATION')
        print('\t\t\t -----------------------')
        print('\t\t\t     SELECT A OPTION:')
        print('\t\t\t -----------------------')
        print('\t\t\t 1.Convert Decimal to Binary')
        print('\t\t\t 2.Convert Decimal to Octal')
        print('\t\t\t 3.Convert Decimal to Hexal')
        print('\t\t\t 4.Exit')
        z=int(input('Enter choice: ') )
        print()
        if z == 1:
            print( D_t_B() )
        elif z == 2:
            print( D_t_O() )
        elif z == 3:
            print( D_t_H() )
        else:
            exit()
Menu()
```

OUTPUT

```
                        -----------------------
                          DATA REPRESENTATION
                        -----------------------
                            SELECT A OPTION:
                        -----------------------
                        1.Convert Decimal to Binary
                        2.Convert Decimal to Octal
                        3.Convert Decimal to Hexal
                        4.Exit
Enter choice: 1

Enter Decimal Number: 344
                        (344)10 = (101011000)2

                        -----------------------
                          DATA REPRESENTATION
                        -----------------------
                            SELECT A OPTION:
                        -----------------------
                        1.Convert Decimal to Binary
                        2.Convert Decimal to Octal
                        3.Convert Decimal to Hexal
                        4.Exit
Enter choice: 2

Enter Decimal Number: 55
                        (55)10 = (67)8

                        -----------------------
                          DATA REPRESENTATION
                        -----------------------
                            SELECT A OPTION:
                        -----------------------
                        1.Convert Decimal to Binary
                        2.Convert Decimal to Octal
                        3.Convert Decimal to Hexal
                        4.Exit
Enter choice: 3

Enter Decimal Number: 29
                        (29)10 = (1D)16

                        -----------------------
                          DATA REPRESENTATION
                        -----------------------
                            SELECT A OPTION:
                        -----------------------
                        1.Convert Decimal to Binary
                        2.Convert Decimal to Octal
                        3.Convert Decimal to Hexal
                        4.Exit


Enter choice: 4

>>>
```

2. SEARCHING

Q.) Create a menu driven program to search an element in a sorted list.

INPUT

```
def Bin_asc():
    x=input('Enter Sorted List: ').split()
    #to input elements with spaces in between

    s=input('Enter Element to be Searched: ')
    print()
    l=0
    u=len(x)-1
    while l <= u:
        m = (l+u)//2
        if s == x[m]:
            print(f'Element {s} is present at index {m} of list')
            break
        elif s > x[m]:
            l = m+1
        else:
            u = m-1
    else:
        print('Element not in list')
    print()
def Bin_desc():
    x=input('Enter Sorted List: ').split()
    #to input elements with spaces in between

    s=input('Enter Element to be Searched: ')
    print()
    l=0
    u=len(x)-1
    while l <= u:
        m = (l+u)//2
        if s == x[m]:
            print(f'Element {s} is present at index {m} of list')
            break
        elif s > x[m]:
            u = m-1
```

```
        else:
            l = m+1
    else:
        print('Element not in list')
    print()

def Binary_Search():
    print('\t\t\t BINARY SEARCH')
    print('\t\t\t 1.Data in Ascending Order')
    print('\t\t\t 2.Data in Descending Order')
    a=int( input('Enter Choice: ') )
    print()
    if a==1:
        Bin_asc()
        print()
    elif a==2:
        Bin_desc()
        print()

def Linear_Search():
    x=input('Enter Sorted List: ').split()
    #to input elements with spaces in between

    s=input('Enter Element to be Searched: ')
    print()
    l=len(x)
    c=0
    y=[]
    if s in x:
        for i in range(l):
            if x[i] == s:
                c += 1
                y.append( str(i) )
        z=','.join(y)
        print(f'Element {s} is present {c} time(s) at index {z} of list')

    else:
        print('Element not in list')
    print()

def Menu():
    while True:

        print('\t\t\t SEARCHING')
        print('\t\t\t 1.Binary Search')
        print('\t\t\t 2.Linear Search')
        print('\t\t\t 3.Exit')
        z=int( input('Enter Choice: ') )
```

```
        print()
        if z==1:
            Binary_Search()
            print()
        elif z==2:
            Linear_Search()
            print()
        else:
            exit()
Menu()
```

OUTPUT

```
                            SEARCHING
                            1.Binary Search
                            2.Linear Search
                            3.Exit
Enter Choice: 1

                            BINARY SEARCH
                            1.Data in Ascending Order
                            2.Data in Descending Order
Enter Choice: 1

Enter Sorted List: 1 1 2 2 2 3 3 4 5 6 6 7
Enter Element to be Searched: 2

Element 2 is present at index 2 of list



                            SEARCHING
                            1.Binary Search
                            2.Linear Search
                            3.Exit
Enter Choice: 1

                            BINARY SEARCH
                            1.Data in Ascending Order
                            2.Data in Descending Order
Enter Choice: 2

Enter Sorted List: 5 5 5 4 4 3 3 3 2 2 1 1 1
Enter Element to be Searched: 1
```

```
Element 1 is present at index 11 of list


                          SEARCHING
                          1.Binary Search
                          2.Linear Search
                          3.Exit
Enter Choice: 2

Enter Sorted List: 1 3 4 5 2 3 6 7 9 5 3 7
Enter Element to be Searched: 3

Element 3 is present 3 time(s) at index 1,5,10 of list


                          SEARCHING
                          1.Binary Search
                          2.Linear Search
                          3.Exit
Enter Choice: 3

>>>
```

3. SORTING

Q.) Create a menu driven program to sort the elements of a given list using different algorithms.

INPUT

```
def Bubble():
    print('\t\t\t BUBBLE SORT')
    print('\t\t\t 1.Ascending Order')
    print('\t\t\t 2.Descending Order')

    a=int( input('Enter Choice: ') )
    print()

    x=[int(el) for el in input('Enter List: ').split()]
    print()
    l=len(x)
    for j in range(l-1):
        for i in range(l-1-j):
            if a == 1:
                if x[i] > x[i+1]:
                    x[i], x[i+1] = x[i+1], x[i]
            else:
                if x[i] < x[i+1]:
                    x[i], x[i+1] = x[i+1], x[i]
    print('Sorted List:', x)

def Insertion():
    print('\t\t\t INSERTION SORT')
    print('\t\t\t 1.Ascending Order')
    print('\t\t\t 2.Descending Order')

    a=int( input('Enter Choice: ') )
    print()
    x=[int(el) for el in input('Enter List: ').split()]
    print()
    l=len(x)
    for i in range(1, l):
        t = x[i]
        j = i-1
        if a == 1:
```

```
            while j >= 0 and t < x[j]:
                x[j+1] = x[j]
                j=j-1
        else:
            while j >= 0 and t > x[j]:
                x[j+1] = x[j]
                j=j-1
        x[j+1]=t
    print('Sorted List:', x)

def Selection():
    print('\t\t\t SELECTION SORT')
    print('\t\t\t 1.Ascending Order')
    print('\t\t\t 2.Descending Order')
    a=int( input('Enter Choice: ') )
    print()

    x=[int(el) for el in input('Enter List: ').split()]

    print()
    l=len(x)
    for i in range(l-1):
        for j in range(i+1, l):
            if a == 1:
                if x[i] > x[j]:
                    x[i], x[j] = x[j], x[i]
            else:
                if x[i] < x[j]:
                    x[i], x[j] = x[j], x[i]

    print('Sorted List:', x)

def Merge():
    print('\t\t\t MERGE SORT')
    print()

    x=eval(input('Enter List 1: '))
    y=eval(input('Enter List 2: '))
    z=[]
    j=0
    for i in range(len(x)):
         while y[j]<x[i]:
              z.append(y[j])
              j=j+1
         z.append(x[i])
    z.extend(y[j:])
    print('Sorted List in Descending Order:', z)
```

```python
def Menu():
    while True:
        print('\t\t\t SORTING')
        print('\t\t\t 1.Bubble Sort')
        print('\t\t\t 2.Insertion Sort')
        print('\t\t\t 3.Selection Sort')
        print('\t\t\t 4.Merge Sort')
        print('\t\t\t 5.Exit')
        z=int( input('Enter Choice: ') )
        print()

        if z == 1:
            Bubble()
            print()
        elif z == 2:
            Insertion()
            print()
        elif z == 3:
            Selection()
            print()
        elif z == 4:
            Merge()
            print()
        else:
            exit()
Menu()
```

OUTPUT

```
                                SORTING
                                1.Bubble Sort
                                2.Insertion Sort
                                3.Selection Sort
                                4.Merge Sort
                                5.Exit
Enter Choice: 1

                                BUBBLE SORT
                                1.Ascending Order
                                2.Descending Order
Enter Choice: 1

Enter List: 1 2 6 4 3 6 2

Sorted List: [1, 2, 2, 3, 4, 6, 6]

                                SORTING
                                1.Bubble Sort
                                2.Insertion Sort
                                3.Selection Sort
                                4.Merge Sort
                                5.Exit

Enter Choice: 1

                               BUBBLE SORT
                               1.Ascending Order
                               2.Descending Order
Enter Choice: 2

Enter List: 2 8 4 2 1 5 3

Sorted List: [8, 5, 4, 3, 2, 2, 1]

                               SORTING
                               1.Bubble Sort
                               2.Insertion Sort
                               3.Selection Sort
                               4.Merge Sort
                               5.Exit
Enter Choice: 2

                               INSERTION SORT
                               1.Ascending Order
                               2.Descending Order
Enter Choice: 1
```

```
Enter List: 1 3 6 2 4 7 4

Sorted List: [1, 2, 3, 4, 4, 6, 7]

                          SORTING
                          1.Bubble Sort
                          2.Insertion Sort
                          3.Selection Sort
                          4.Merge Sort
                          5.Exit
Enter Choice: 2

                          INSERTION SORT
                          1.Ascending Order
                          2.Descending Order
Enter Choice: 2

Enter List: 2 3 9 1 5 7 8

Sorted List: [9, 8, 7, 5, 3, 2, 1]


                          SORTING
                          1.Bubble Sort
                          2.Insertion Sort
                          3.Selection Sort
                          4.Merge Sort
                          5.Exit
Enter Choice: 3

                          SELECTION SORT
                          1.Ascending Order
                          2.Descending Order
Enter Choice: 1

Enter List: 5 6 8 3 9 10 22

Sorted List: [3, 5, 6, 8, 9, 10, 22]

                          SORTING
                          1.Bubble Sort
                          2.Insertion Sort
                          3.Selection Sort
                          4.Merge Sort
                          5.Exit
```

```
Enter Choice: 4

                        MERGE SORT

Enter List 1: [1,2,3,4]
Enter List 2: [3,4,5,6,7]
Sorted List in Descending Order: [1, 2, 3, 3, 4, 4, 5, 6, 7]


                        SORTING
                        1.Bubble Sort
                        2.Insertion Sort
                        3.Selection Sort
                        4.Merge Sort
                        5.Exit
Enter Choice: 5

>>>
```

4. STRING HANDLING

Q.) Write a program that inputs and reads a string and performs various inbuilt python string manipulation methods.

INPUT

```
s=str(input('enter a string:'))
l=len(s)

print('original string is',s)

#capitalizing alternate elements in a string
s2=''
for i in range(0,l,2):
    s2=s2+s[i]
    if i<(l-1):
        s2=s2+s[i+1].upper()
print('alternatively capitalized string is',s2)

#split a string on a specific characters
print(s.split(' '))

#reverse a string
print(''.join(reversed(s)))

#string slicing
string='python is a great language.'
print(string)
print(string[:6])
print(string[7:13])
print(string[0:-1:2])
```

OUTPUT

```
enter a string:'python is a computer language'
original string is 'python is a computer language'
alternatively capitalized string is 'PyThOn iS A CoMpUtEr lAnGuAgE'
["'python", 'is', 'a', 'computer', "language'"]
'egaugnal retupmoc a si nohtyp'
python is a great language.
python
is a g
pto sagetlnug
>>>
```

5. LIST HANDLING

Q.) Write a program that inputs and reads a list and performs various inbuilt python list manipulation methods.

INPUT

```
l = [1,2,3,4,5,6,7,7,87,7,7,7,7,7,7,73,3,3,3]

while 7 in l:
    l.remove(7)

for i in range(len(l)):
    l.append(i)

l.extend([321,234,432,345,543,456])

del(l[0])

l.insert(4,5)

print(l)
```

OUTPUT

```
[2, 3, 4, 5, 5, 6, 87, 73, 3, 3, 3, 0, 1, 2, 3, 4, 5, 6, 7, 8
, 9, 10, 321, 234, 432, 345, 543, 456]
>>>
```

6. TUPLE HANDLING

Q.) Write a program that inputs and reads a tuple and performs various inbuilt python tuple manipulation methods.

INPUT

```
l=eval(input('Enter a list to convert into tuple: '))
t=tuple(l)

tl=len(t)
print('Length of tuple', tl)

tmax=max(t)
tmin=min(t)
print('Maximum value of tuple: ',tmax)
print('Miniimum value of tuple: ',tmin)

n=int(input('Enter number to be counted from tuple: '))
tc=t.count(n)
print('The number ',n ,'has occured ',tc , 'no. of times')
```

OUTPUT

```
Enter a list to convert into tuple: [1,3,5,7,6,6,9,33]
Length of tuple 8
Maximum value of tuple:  33
Miniimum value of tuple:  1
Enter number to be counted from tuple: 6
The number  6 has occured  2 no. of times
>>>
```

7. DICTIONARY HANDLING

Q.) Write a program that inputs and reads a dictionary and performs various inbuilt python dictionary manipulation methods.

INPUT

```
n=int(input('Enter number of entries: '))
d={}
for i in range (n):
     key=int(input('Enter key: '))
     value=input('Enter value: ')
     d[key]=value
print('The dictionary is: ',d)

print('Length of dictionary is: ',len(d))

print(d.keys())
print(d.values())

d[4]='d'
print('New dictionary is: ',d)
```

OUTPUT

```
Enter number of entries: 3
Enter key: 1
Enter value: a
Enter key: 2
Enter value: b
Enter key: 3
Enter value: c
The dictionary is:  {1: 'a', 2: 'b', 3: 'c'}
Length of dictionary is:  3
dict_keys([1, 2, 3])
dict_values(['a', 'b', 'c'])
New dictionary is:  {1: 'a', 2: 'b', 3: 'c', 4: 'd'}
>>>
```

8. LOGIC BASED PROGRAM ON STRING/LIST/TUPLE/DICTIONARY

9. FLOOR DIVISION / MODULUS

10. OPERATORS IN PYTHON

11. RANDOM

INPUT

```
import random

numbers = range(11)
string = 'testString'
alpha_numeric = ''
for i in range(random.randint(0,20)):
     alpha_numeric += str(random.choice(numbers))
     if random.choice([True,False]):
          alpha_numeric += random.choice(string)

print(alpha_numeric)
```

OUTPUT

```
6S3g5n10g
>>>
```

12. FILE HANDLING (TEXT MODE)

--> removing all empty lines

INPUT

```
with open('abc.txt','r') as f:
      s = f.read().split('\n')
      while '' in s:
            s.remove('')
      for i in range(len(s)):
            s[i]+='\n'

with open('abc.txt','w') as f:
      f.writelines(s)
```

OUTPUT

Initially:
file

handling

text

Finally:

file
handling
text

13. FILE HANDLING (BINARY MODE)

INPUT

```
import pickle

with open('abc.dat','rb') as f:
    try:
        while True:
            s = pickle.load(f)
            print(s)
    except EOFError:
        print("End of file reached")
```

OUTPUT

```
bye
hello
how are you?
where are you?
bye
End of file reached
>>>
```

14. FILE HANDLING (CSV)

INPUT

```
import csv
with open('abc.csv','r') as f:
      reader = csv.reader(f,delimiter = ',')
      for row in reader:
            for item in row:
                  print(item,end = ' ')
            print()
```

OUTPUT

```
Name Class
Someone 12
Nobody 11
>>>
```

15. USER DEFINED FUNCTION

16. MYSQL QUERIES

Program 1*: Write a SQL program to create a table with suitable fields*

Code:

CREATE TABLE jobs (
JOB_ID integer NOT NULL UNIQUE PRIMARY KEY,
JOB_TITLE varchar(35) NOT NULL DEFAULT ' ',
MIN_SALARY decimal(6,0) DEFAULT 8000,
MAX_SALARY decimal(6,0) DEFAULT NULL
);

Output:

```
mysql> CREATE TABLE jobs (
    -> JOB_ID integer NOT NULL UNIQUE PRIMARY KEY,
    -> JOB_TITLE char(10) NOT NULL DEFAULT ' ',
    -> MIN_SALARY decimal(6,0) DEFAULT 8000,
    -> MAX_SALARY decimal(6,0) DEFAULT NULL
    -> );
Query OK, 0 rows affected (1.92 sec)
```

Program 2: *Write a MySQL program to enter three records at once.*

Code:

insert into jobs values(281,'Engineer',24435,291198),(991,'Engineer',246645,291198),(721,'Engineer',287645,291348);

Output:

```
mysql> insert into jobs values(281,'Engineer',24435,291198),(991,'Engineer',246645,291198),(721,'Engineer',287645,291348);
Query OK, 3 rows affected (0.14 sec)
Records: 3  Duplicates: 0  Warnings: 0
```

<u>Consider the table empl given below and run the following Queries.</u>

empno	enmae	job	mgr	hiredate	sal	comm	deptno
8369	SMITH	CLERK	8902	1991-12-18	800	NULL	20
8499	ANYA	SALESMAN	8698	1991-02-20	1600	300	30
8521	SETH	SALESMAN	8698	1991-02-22	1250	500	30
8566	MAHADEVAN	MANAGER	8839	1991-04-02	2985	NULL	20
8654	MOMIN	SALESMAN	8698	1991-09-28	1250	1400	30
8882	SHIAUNSH	MANAGER	8839	1991-06-09	2450	NULL	10
8698	BINA	MANAGER	8339	1991-05-10	2850	NULL	30
8888	SCOTT	ANALYST	8566	1992-12-09	3000	NULL	20
8839	AMIR	PRESIDENT	NULL	1991-11-18	5000	NULL	10
8844	KULDEEP	SALESMAN	8698	1991-09-08	1500	0	30
8886	ANOOP	CLERK	8888	1993-01-12	110000	NULL	20
8900	JATIN	CLERK	8698	1991-12-03	950	NULL	30
8902	FAKIR	ANALYST	8566	1991-12-03	3000	NULL	20
8934	MITA	CLERK	8882	1992-01-23	1300	NULL	10

1. List the details of those employees whose annual salary is between
25000 and 40000.

SELECT * FROM empl where sal BETWEEN 2500 AND 4000;

empno	enmae	job	mgr	hiredate	sal	comm	deptno
8566	MAHADEVAN	MANAGER	8839	1991-04-02	2985	NULL	20
8698	BINA	MANAGER	8339	1991-05-10	2850	NULL	30
8888	SCOTT	ANALYST	8566	1992-12-09	3000	NULL	20
8902	FAKIR	ANALYST	8566	1991-12-03	3000	NULL	20

2. Display the name of employees whose name contains 'A' as the 4th alphabet.

SELECT ename FROM empl WHERE ename like '___a%';

enmae
ANYA
MAHADEVAN
SHIAUNSH
BINA
MITA

3. Display Name, Job and Salary of employees who do not have a manager.

SELECT ename, job, sal FROM empl WHERE mgr IS NULL;

enmae	job	sal
AMIR	PRESIDENT	5000

4. Display Name, Salary and salary added with commision.

SELECT ename, sal, sal+comm FROM empl;

enmae	sal	sal+comm
SMITH	800	NULL
ANYA	1600	1900
SETH	1250	1750
MAHADEVAN	2985	NULL
MOMIN	1250	2650
SHIAUNSH	2450	NULL
BINA	2850	NULL
SCOTT	3000	NULL
AMIR	5000	NULL
KULDEEP	1500	1500
ANOOP	110000	NULL
JATIN	950	NULL
FAKIR	3000	NULL
MITA	1300	NULL

5. Display details of employees who earn more commission than their salaries.

SELECT * FROM empl WHERE comm>sal;

empno	enmae	job	mgr	hiredate	sal	comm	deptno
8654	MOMIN	SALESMAN	8698	1991-09-28	1250	1400	30

<u>Consider the table EMPLOYEE given below and run the following Queries.</u>

ID	First_Name	Last_Name	User_ID	Salary
1	DIM	JOSEPH	JDIM	5000
2	jagganath	MISHRA	JNMISHRA	4000
3	SIDDHARTH	MISHRA	SMISHRA	8000
4	SHANKAR	GIRI	SGIRI	7000
5	GAUTAM	BUDDHA	BGAUTAM	2000

1. For record with ID=4 update record with last Name, User ID and Salary.

UPDATE employe SET Last_Name=’SAHUKAR’,User_ID=’skar’,Salary=9000 WHERE ID=4;

ID	First_Name	Last_Name	User_ID	Salary
1	DIM	JOSEPH	JDIM	5000
2	jagganath	MISHRA	JNMISHRA	4000
3	SIDDHARTH	MISHRA	SMISHRA	8000
4	SHANKAR	SAHUKAR	skar	9000
5	GAUTAM	BUDDHA	BGAUTAM	2000

2. Modify the last name of employees to Gautam where salary<5000.

UPDATE employe SET Last_Name=’Gautam’ WHERE Salary;

ID	First_Name	Last_Name	User_ID	Salary
1	DIM	JOSEPH	JDIM	5000
2	jagganath	Gautam	JNMISHRA	4000
3	SIDDHARTH	MISHRA	SMISHRA	8000
4	SHANKAR	SAHUKAR	skar	9000
5	GAUTAM	Gautam	BGAUTAM	2000

3. Add column Email of data type VARCHAR to the table.

ALTER TABLE employe ADD(Email VARCHAR(30));

ID	First_Name	Last_Name	User_ID	Salary	Email
1	DIM	JOSEPH	JDIM	5000	NULL
2	jagganath	Gautam	JNMISHRA	4000	NULL
3	SIDDHARTH	MISHRA	SMISHRA	8000	NULL
4	SHANKAR	SAHUKAR	skar	9000	NULL
5	GAUTAM	Gautam	BGAUTAM	2000	NULL

4. Delete the employee record having first name as SIDDHARTH.

DELETE FROM employe WHERE First_Name=’SIDDHARTH’;

ID	First_Name	Last_Name	User_ID	Salary	Email
1	DIM	JOSEPH	JDIM	5000	NULL
2	jagganath	Gautam	JNMISHRA	4000	NULL
4	SHANKAR	SAHUKAR	skar	9000	NULL
5	GAUTAM	Gautam	BGAUTAM	2000	NULL

5. Modify the salary and increases it by 1000, for all who get salary less than 5000.

UPDATE employe SET Salary =Salary+1000 WHERE Salary<5000;

ID	First_Name	Last_Name	User_ID	Salary	Email
1	DIM	JOSEPH	JDIM	5000	NULL
2	jagganath	Gautam	JNMISHRA	5000	NULL
4	SHANKAR	SAHUKAR	skar	9000	NULL
5	GAUTAM	Gautam	BGAUTAM	3000	NULL

17. MYSQL CONNECTIVITY

18. STACKS

INPUT

```
stack=[]
size=0
s=0
def push():
    global s,size
    if s==size:
        print('Over Flow')
    else:
        s=s+1
        e=int(input("ENTER DATA:"))
        stack.append(e)

def pop():
    global s
    top=-1
    if stack==[]:
        print('Under Flow')
    else:
        print("Element popped is:",stack[-1])
        del(stack[top])
        s=s-1

def display():
    if stack==[]:
        print('Under Flow')
    else:
        q=len(stack)
        for top in range (q-1,-1,-1):
            print(stack[top])


def menu():
    global size
    size=int(input('Enter the size of the stack:'))
    while True:
```

```
        print("\t\t\t1. Push")
        print("\t\t\t2. Pop")
        print("\t\t\t3. Display")
        print("\t\t\t4. Exit")
        c=int(input("ENTER CHOICE:"))
        if c==1:
            push()
        elif c==2:
            pop()
        elif c==3:
            display()
        else:
            break
menu()
```

OUTPUT

```
Enter the size of the stack:2
                        1. Push
                        2. Pop
                        3. Display
                        4. Exit
ENTER CHOICE:1
ENTER DATA:1
                        1. Push
                        2. Pop
                        3. Display
                        4. Exit
ENTER CHOICE:1
ENTER DATA:2
                        1. Push
                        2. Pop
                        3. Display
                        4. Exit
```

```
ENTER CHOICE:1
Over Flow
                                1. Push
                                2. Pop
                                3. Display
                                4. Exit
ENTER CHOICE:2
Element popped is: 2
                                1. Push
                                2. Pop
                                3. Display
                                4. Exit
ENTER CHOICE:2
Element popped is: 1
                                1. Push
                                2. Pop
                                3. Display
                                4. Exit
ENTER CHOICE:2
Under Flow
                                1. Push
                                2. Pop
                                3. Display
                                4. Exit
ENTER CHOICE:1
ENTER DATA:1
                                1. Push
                                2. Pop
                                3. Display
                                4. Exit
ENTER CHOICE:3
1
                                1. Push
                                2. Pop
                                3. Display
                                4. Exit
ENTER CHOICE:2
```

```
Element popped is: 1
                                1. Push
                                2. Pop
                                3. Display
                                4. Exit
ENTER CHOICE:3
Under Flow
                                1. Push
                                2. Pop
                                3. Display
                                4. Exit
ENTER CHOICE:4
>>>
```

19. QUEUES

INPUT

```
queue=[]
r=f=None

def enqueue():
     global queue,r,f
     if queue==[]:
          r=0
     else:
          r=r+1
     e=int(input("Enter Element:"))
     queue.insert(r,e)

def dequeue():
     global queue,r,f
     if queue==[]:
          return "Empty Queue"
     else:
          f=0
          print('Element to be removed is:', queue[f])
          del(queue[f])


def display():
     global queue,r,f
     if queue==[]:
          print("Empty Queue")
     else:
          q=len(queue)
          for i in range (q):
               print(queue[i],end='-')
```

```
def menu():
    global queue,r,f
    queue=[]
    f=None
    while True:
        print("\t\t\tQUEUE OPERATIONS")
        print("\t\t\t1. Enqueue")
        print("\t\t\t2. Dequeue")
        print("\t\t\t3. Display")
        print("\t\t\t4. Exit")
        c=int(input("ENTER CHOICE:"))
        if c==1:
            enqueue()
        elif c==2:
            dequeue()
        elif c==3:
            display()

        else:
            break
menu()
```

OUTPUT

```
                    QUEUE OPERATIONS
                    1. Enqueue
                    2. Dequeue
                    3. Display
                    4. Exit
ENTER CHOICE:1
Enter Element:1
                    QUEUE OPERATIONS
                    1. Enqueue
                    2. Dequeue
                    3. Display
                    4. Exit
ENTER CHOICE:1
Enter Element:2
```

```
                        QUEUE OPERATIONS
                        1. Enqueue
                        2. Dequeue
                        3. Display
                        4. Exit
ENTER CHOICE:3
1-2-                    QUEUE OPERATIONS
                        1. Enqueue
                        2. Dequeue
                        3. Display
                        4. Exit
ENTER CHOICE:2
Element to be removed is: 1
                        QUEUE OPERATIONS
                        1. Enqueue
                        2. Dequeue
                        3. Display
                        4. Exit
ENTER CHOICE:2
Element to be removed is: 2
                        QUEUE OPERATIONS
                        1. Enqueue
                        2. Dequeue
                        3. Display
                        4. Exit
ENTER CHOICE:3
Empty Queue
                        QUEUE OPERATIONS
                        1. Enqueue
                        2. Dequeue
                        3. Display
                        4. Exit
ENTER CHOICE:4
```

20. ART INTEGRATION PROJECT

INPUT

```
import pymysql

import matplotlib.pyplot as plt

from tkinter import *


def create_table():

  db=pymysql.connect(host="localhost",user="root",passwd=rootpwd,db=database)

  cur=db.cursor()

  cur.execute("create table stu(Roll int,Name char(20),Class char(5),English int,
 Physics int, Chemistry int, Maths int, Computers int, Percentage char(6),Grade ch
ar(2), Remark char(4));")

  db.commit()

  cur.close()

  db.close()


def add_record_screen():

  global mainframe

  mainframe.destroy()

  mainframe = Frame(root,width=1100,height=600,bg="#111")

  mainframe.grid_propagate(0)

  mainframe.pack()


  def add_record():

    roll=int(rolle.get())

    name=namee.get()
```

```
    clas=clase.get()

    eng=int(enge.get())

    mat=int(mate.get())

    cs=int(cse.get())

    chem=int(cheme.get())

    phy=int(phye.get())

    total = eng+mat+phy+chem+cs

    perc = round(total/500 * 100,2)

    if perc > 33 : rem = 'PASS'

    else: rem = 'FAIL'

    if perc > 90: grade = 'A1'

    elif perc > 80: grade = 'A2'

    elif perc > 70: grade = 'B1'

    elif perc > 60: grade = 'B2'

    elif perc > 50: grade = 'C1'

    elif perc > 40: grade = 'C2'

    elif perc > 33: grade = 'D'

    else: grade = 'F'

    perc = str(perc)+"%"


    db=pymysql.connect(host="localhost",user="root",passwd=rootpwd,db=database)

    cur=db.cursor()

    cur.execute(f"insert into stu values({roll},\"{name}\",\"{clas}\",{eng},{phy}
,{chem},{mat},{cs},\"{perc}\",\"{grade}\",\"{rem}\");")

    db.commit()

    cur.close()

    db.close()
```

```
    rolle.delete(0,'end')

    namee.delete(0,'end')

    clase.delete(0,'end')

    enge.delete(0,'end')

    phye.delete(0,'end')

    cheme.delete(0,'end')

    mate.delete(0,'end')

    cse.delete(0,'end')


  Label(mainframe,bg="#111",fg="#fff",text='Roll No.').grid(row=1,column=1)

  Label(mainframe,bg="#111",fg="#fff",text='Name').grid(row=2,column=1)

  Label(mainframe,bg="#111",fg="#fff",text='Class').grid(row=3,column=1)

  Label(mainframe,bg="#111",fg="#fff",text='English').grid(row=4,column=1)

  Label(mainframe,bg="#111",fg="#fff",text='Physics').grid(row=5,column=1)

  Label(mainframe,bg="#111",fg="#fff",text='Chemistry').grid(row=6,column=1)

  Label(mainframe,bg="#111",fg="#fff",text='Mathematics').grid(row=7,column=1)

  Label(mainframe,bg="#111",fg="#fff",text='Comuper Science').grid(row=8,column=1
)


  rolle = Entry(mainframe)

  rolle.grid(row=1,column=2)

  namee = Entry(mainframe)

  namee.grid(row=2,column=2)

  clase = Entry(mainframe)

  clase.grid(row=3,column=2)

  enge = Entry(mainframe)
```

```
    enge.grid(row=4,column=2)

    phye = Entry(mainframe)

    phye.grid(row=5,column=2)

    cheme = Entry(mainframe)

    cheme.grid(row=6,column=2)

    mate = Entry(mainframe)

    mate.grid(row=7,column=2)

    cse = Entry(mainframe)

    cse.grid(row=8,column=2)


    Button(mainframe,text="Back",command=Menu).grid(row=9,column=1)

    Button(mainframe,text="Submit",command=add_record).grid(row=9,column=2)


def display():

    global box

    db=pymysql.connect(host="localhost",user="root",passwd=rootpwd,db=database)

    cur=db.cursor()

    rows=cur.execute("select * from stu;")

    rec=cur.fetchall()

    records = """

+----------+-------------------------+----------+----------+----------+----------
+----------+----------+----------+----------+----------+

|Roll No.  |Name                     |Class     |English   |Physics   |Chemistry |
Maths     |CS        |Percentage|Grade     |Remarks   |

+----------+-------------------------+----------+----------+----------+----------
+----------+----------+----------+----------+----------+

"""

    for i in rec:
```

```
    for j in range(len(i)):
      if j==0: records+="|"
      if j==1: records += "{0:<25}|".format(i[j])
      else:  records += "{0:<10}|".format(i[j])
    records+="\n+----------+-------------------------+----------+----------+-----
-----+----------+----------+----------+----------+----------+----------+\n"
  cur.close()
  db.close()
  box.configure(state='normal')
  box.insert('end', records)
  box.configure(state='disabled')

def display_graph():
  db=pymysql.connect(host="localhost",user="root",passwd=rootpwd,db=database)
  cur=db.cursor()

  rows=cur.execute("select * from stu;")
  all_records=cur.fetchall()
  avg_eng=avg_phy=avg_chem=avg_maths=avg_cs=0
  for i in all_records:
    avg_eng+=i[3]
    avg_phy+=i[4]
    avg_chem+=i[5]
    avg_maths+=i[6]
    avg_cs+=i[7]

  avg_eng/=rows
```

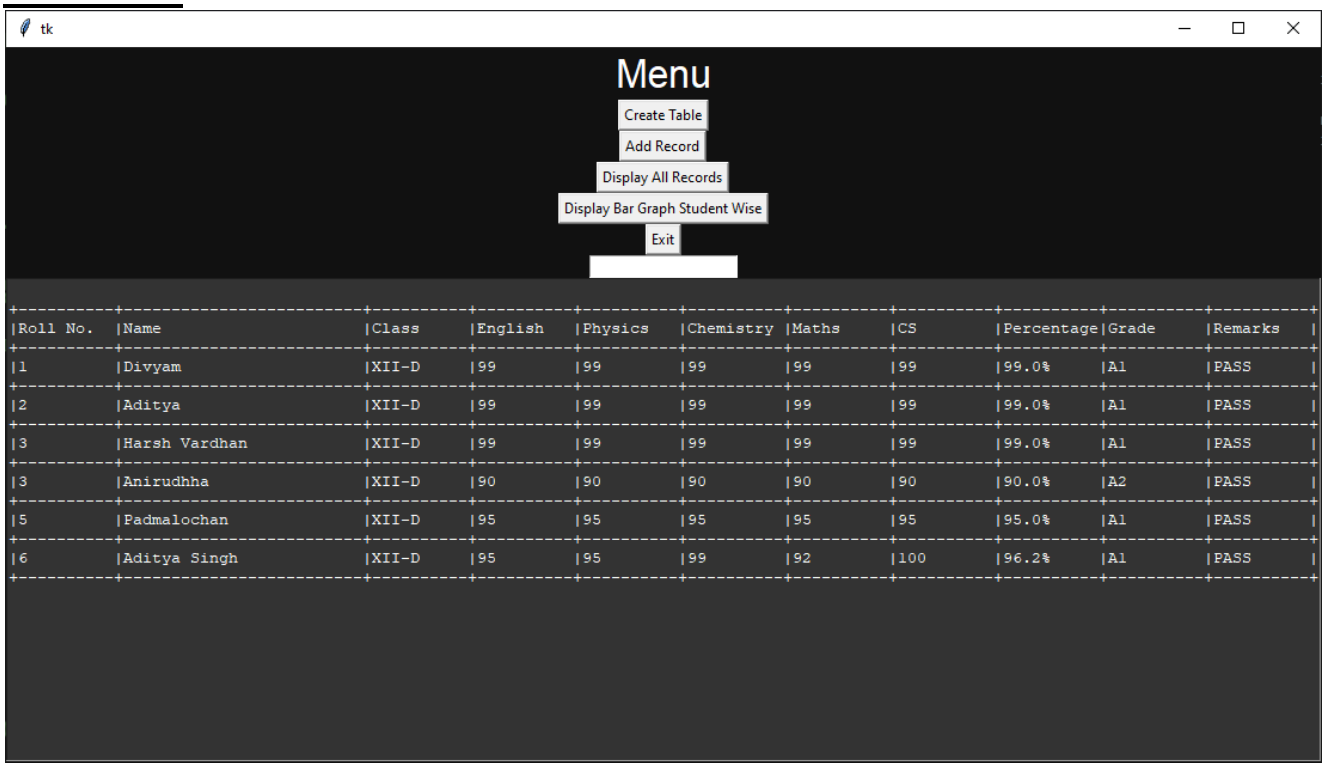
```
avg_phy/=rows

avg_chem/=rows

avg_maths/=rows

avg_cs/=rows


bg2=[avg_eng,avg_phy,avg_chem,avg_maths,avg_cs]


try: rr=int(roll_no.get())

except:

  print('Please enter roll no.')

  return

aa=f"select * from stu where roll='{rr}';"

rows=cur.execute(aa)

rec=cur.fetchall()


bg1=[]

x=["English","Physics","Chemistry","Mathematics","Computer Science"]


barWidth = 0.1


for i in rec:

  bg1.append(i[3])

  bg1.append(i[4])

  bg1.append(i[5])

  bg1.append(i[6])

  bg1.append(i[7])
```

```
  r1 = [0,1,2,3,4]

  r2 = [i + barWidth for i in r1]


  plt.bar(r1,bg2,width=0.1,label="Class Average")

  plt.bar(r2,bg1,width=0.1,label="Student")

  plt.xlabel('group', fontweight='bold')

  plt.xticks([r + barWidth for r in range(len(bg1))], ['English', 'Physics', 'Che
mistry', 'Maths', 'CS'])


  plt.legend()

  plt.show()

  cur.close()

  db.close()


def Menu():

  global mainframe,box,roll_no

  mainframe.destroy()

  mainframe = Frame(root,width=1100,height=600,bg="#111")

  mainframe.grid_propagate(0)

  mainframe.pack()

  Label(mainframe,text="Menu",bg="#111",fg="#fff",font=('serif',25)).grid(row=1,c
olumn=1)

  Button(mainframe,text="Create Table",command=create_table).grid(row=2,column=1)

  Button(mainframe,text="Add Record",command=add_record_screen).grid(row=3,column
=1)

  Button(mainframe,text="Display All Records",command=display).grid(row=4,column=
1)

  Button(mainframe,text="Display Bar Graph Student Wise",command=display_graph).g
rid(row=5,column=1)
```

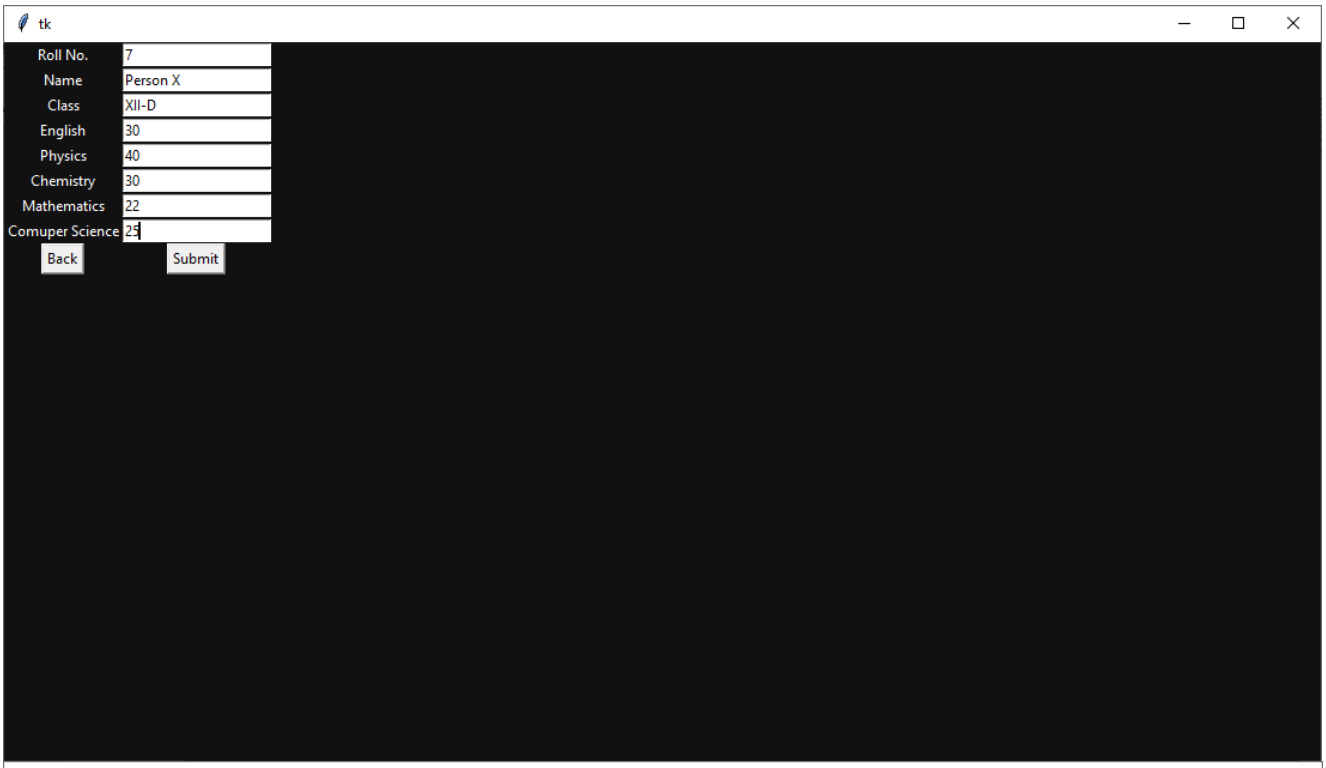
```
  Button(mainframe,text="Exit",command=quit).grid(row=6,column=1)

  roll_no = Entry(mainframe)

  roll_no.grid(row=7,column=1)

  box=Text(mainframe,width=137,height=25,bg='#333',fg='#fff',state='disabled')

  box.grid(row=8,column=1)


def connect(a1,a2):

  global database,rootpwd

  rootpwd = a1

  database = a2

  Menu()


def connect_screen():

  e1 = Entry(mainframe,show="*")

  e2 = Entry(mainframe)

  Label(mainframe,text="Enter root@localhost Password",bg="#111",fg="#fff").grid(
row=1,column=1)

  e1.grid(row=1,column=2)

  Label(mainframe,text="Enter name of database to be used",bg="#111",fg="#fff").g
rid(row=2,column=1)

  e2.grid(row=2,column=2)

  Button(mainframe,text="Submit",command=lambda: connect(e1.get(),e2.get()) ).gri
d(row=3,column=1,columnspan=2)


root = Tk()

root.geometry('1100x600')

mainframe = Frame(root,width=1100,height=600,bg="#111")

mainframe.grid_propagate(0)
```

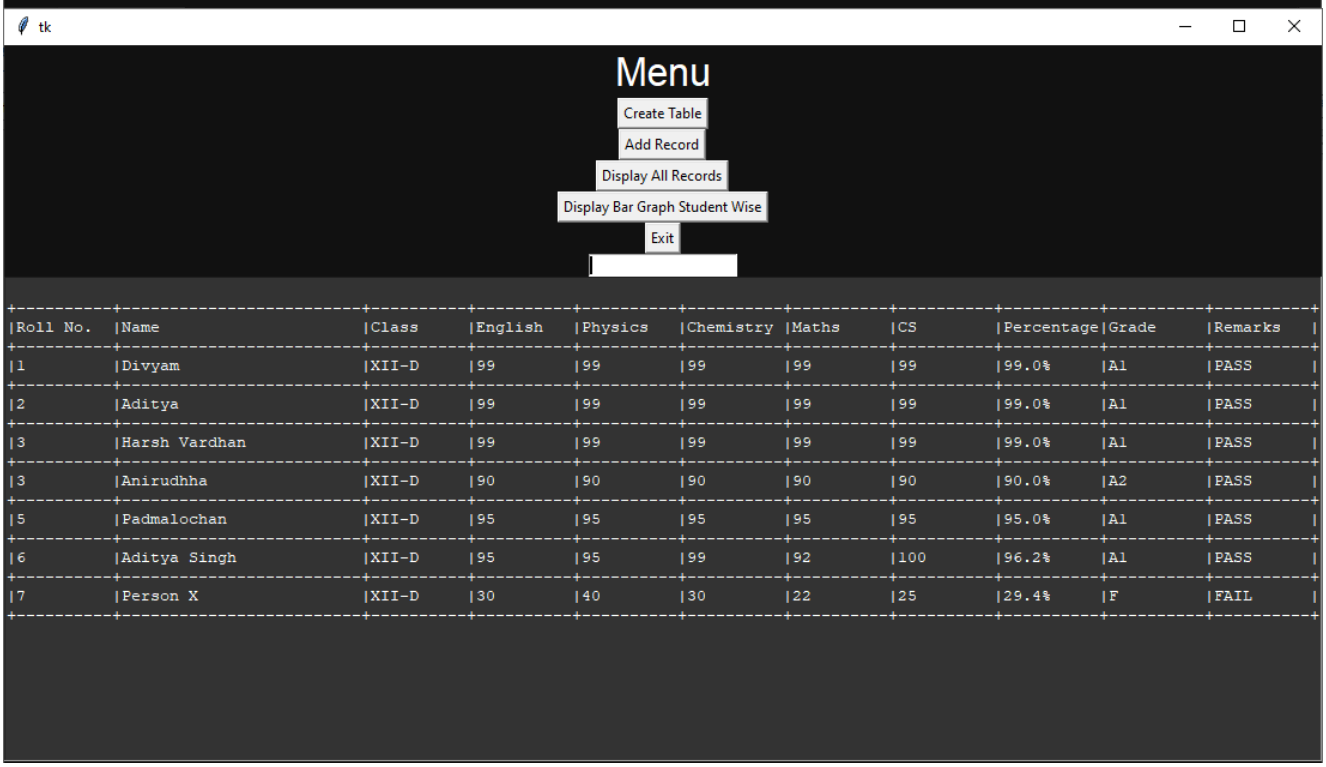
```
mainframe.pack()

connect_screen()

root.mainloop()
```

OUTPUT:



Roll No.	Name	Class	English	Physics	Chemistry	Maths	CS	Percentage	Grade	Remarks
1	Divyam	XII-D	99	99	99	99	99	99.0%	A1	PASS
2	Aditya	XII-D	99	99	99	99	99	99.0%	A1	PASS
3	Harsh Vardhan	XII-D	99	99	99	99	99	99.0%	A1	PASS
3	Anirudhha	XII-D	90	90	90	90	90	90.0%	A2	PASS
5	Padmalochan	XII-D	95	95	95	95	95	95.0%	A1	PASS
6	Aditya Singh	XII-D	95	95	99	92	100	96.2%	A1	PASS





Roll No.	Name	Class	English	Physics	Chemistry	Maths	CS	Percentage	Grade	Remarks
1	Divyam	XII-D	99	99	99	99	99	99.0%	A1	PASS
2	Aditya	XII-D	99	99	99	99	99	99.0%	A1	PASS
3	Harsh Vardhan	XII-D	99	99	99	99	99	99.0%	A1	PASS
3	Anirudhha	XII-D	90	90	90	90	90	90.0%	A2	PASS
5	Padmalochan	XII-D	95	95	95	95	95	95.0%	A1	PASS
6	Aditya Singh	XII-D	95	95	99	92	100	96.2%	A1	PASS
7	Person X	XII-D	30	40	30	22	25	29.4%	F	FAIL

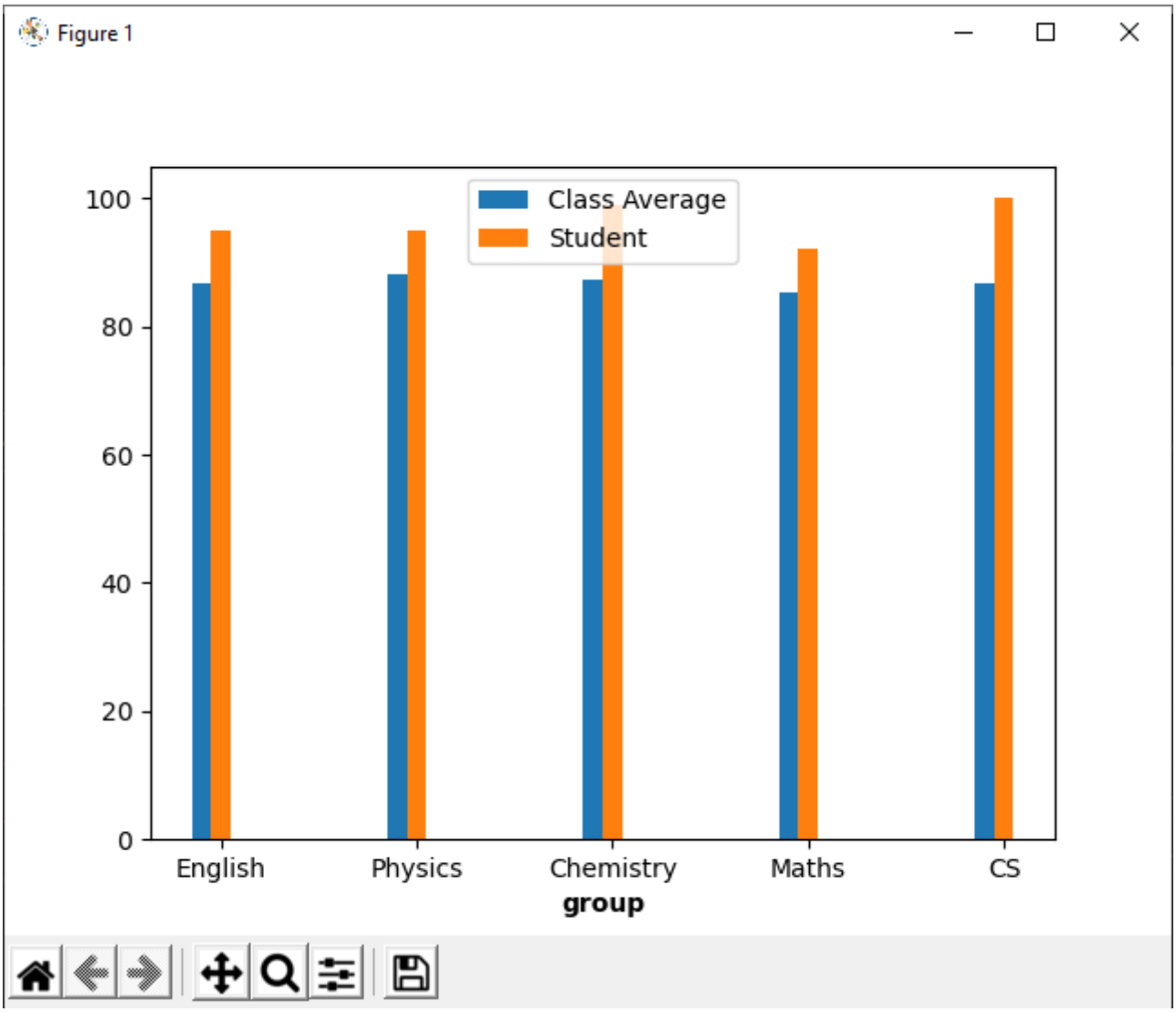


Figure 1
Class Average
Student
100
80
60
40
20
0
English
Physics
Chemistry
Maths
CS
group