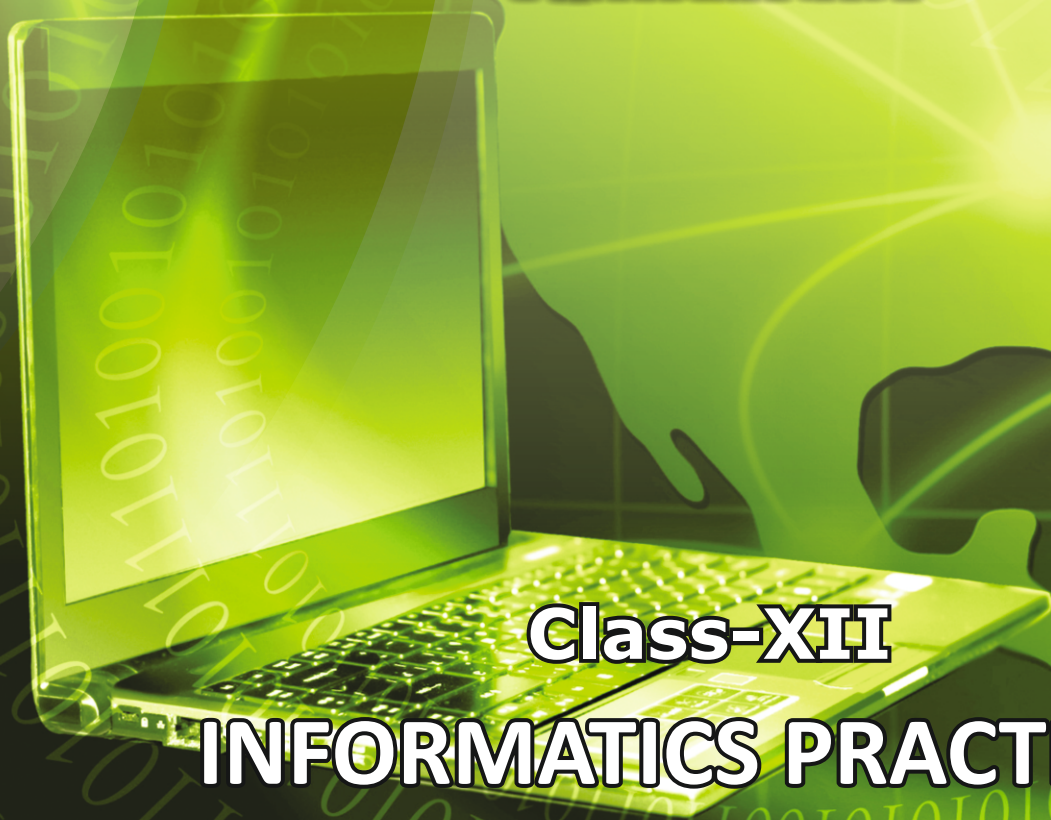


# STUDENT SUPPORT MATERIAL

Session : 2019-20



तत् त्वं पूषन् अपावृणु  
केन्द्रीय विद्यालय संगठन



**Class-XII**  
**INFORMATICS PRACTICES**



KENDRIYA VIDYALAYA SANGATHAN

REGIONAL OFFICE, DELHI

An Autonomous Body Under MHRD, Government of India

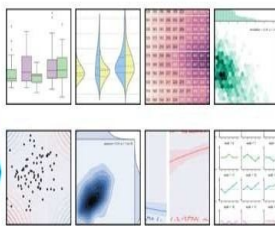
# STUDENT SUPPORT MATERIAL

## INFORMATICS PRACTICES

SESSION 2019-20

CLASS-XII

Data Visualization with Python



संतोष कुमार मल्ल, भा.प्र.से.  
आयुक्त  
Santosh Kumar Mall, I.A.S.  
Commissioner



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## A WORD TO MY DEAR STUDENTS

It gives me great pleasure in presenting the Students' Support Material to all KV students of class XII.

The material has been prepared keeping in mind your needs when you are preparing for final exams and wish to revise and practice questions or when you want to test your ability to complete the question paper in the time allotted or when you come across a question while studying that needs an immediate answer but going through the text book will take time or when you want to revise the complete concept or idea in just a minute or try your hand at a question from a previous CBSE Board exam paper or the Competitive exam to check your understanding of the chapter or unit you have just finished. This material will support you in any way you want to use it.

A team of dedicated and experienced teachers with expertise in their subjects has prepared this material after a lot of exercise. Care has been taken to include only those items that are relevant and are in addition to or in support of the text book. This material should not be taken as a substitute to the NCERT text book but it is designed to supplement it.

The Students' Support Material has all the important aspects required by you; a design of the question paper, syllabus, all the units/chapters or concepts in points, mind maps and information in tables for easy reference, sample test items from every chapter and question papers for practice along with previous years Board exam question papers.

I am sure that the Support Material will be used by both students and teachers and I am confident that the material will help you perform well in your exams.

Happy learning!

Santosh Kumar Mall  
Commissioner, KVS

## FOREWORD

The Students' Support Material is a product of an in-house academic exercise undertaken by our subject teachers under the supervision of subject expert at different levels to provide the students a comprehensive, yet concise, learning support tool for consolidation of your studies. It consists of lessons in capsule form, mind maps, concepts with flow charts, pictorial representation of chapters wherever possible, crossword puzzles, question bank of short and long answer type questions with previous years' CBSE question papers.

The material has been developed keeping in mind latest CBSE curriculum and question paper design. This material provides the students a valuable window on precise information and it covers all essential components that are required for effective revision of the subject.

In order to ensure uniformity in terms of content, design, standard and presentation of the material, it has been fine tuned at KVS Hqrs level.

I hope this material will prove to be a good tool for quick revision and will serve the purpose of enhancing students' confidence level to help them perform better. Planned study blended with hard work, good time management and sincerity will help the students reach the pinnacle of success.

Best of Luck.



**U.N. Khaware**  
Additional Commissioner (Acad.)

Information  
Practices



# STUDENT SUPPORT MATERIAL

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# UNIT:- 1

## Data Handling (DH-2)

**Python Pandas:** *Pandas* is the most popular python library that is used for data analysis.

We can analyze data in pandas with:

1. Series
2. Data Frames

### **Advanced operations on Data Frames: Pivoting, Sorting, and Aggregation**

There are two functions available in python for pivoting data frame.

1. `pivot()`
2. `pivot_table()`

1. `Pivot ()` - This function is used to create a new derived table(`pivot`) from existing Data Frame. It takes 3 arguments: `index`, `columns`, and `values`.

- As a value for each of these parameters we need to specify a column name in the original table (`DataFrame`).
- Then the `pivot` function will create a new table (`pivot`), whose row and column indices are the unique values of the respective parameters.
- The cell values of the new table are taken from column given as the `values` parameter.

With `pivot()`, if there are multiple entries for the same values for `index(row)`, it leads to error. As a value for each of these parameters we need to specify a column name in the original table (`DataFrame`). Then the `pivot` function will create a new table (`pivot`), whose row and column indices are the unique values of the respective parameters. The cell values of the new table are taken from column given as the `values` parameter.

2. `Pivot Table`: The `pivot_table()` method comes to solve this problem. It works like `pivot`, but it aggregates the values from rows with duplicate entries for the specified columns.

Syntax:-

```
df.pivot_table(index='ITEM',columns='COMPANY',values='RUPEES',aggfunc=np.mean)
```

#Example of pivot() program

```
from collections import OrderedDict
from pandas import DataFrame
import pandas as pd
import numpy as np
table = OrderedDict((
("ITEM", ['TV', 'TV', 'AC', 'AC']),
('COMPANY',['LG', 'VIDEOCON', 'LG', 'SONY']),
('RUPEES', ['12000', '10000', '15000', '14000']),
('USD', ['700', '650', '800', '750'])))
d = DataFrame(table)
print("DATA OF DATAFRAME")
print(d)
p = d.pivot(index='ITEM', columns='COMPANY', values='RUPEES')
print("\n\nDATA OF PIVOT")
print(p)
print (p[p.index=='TV'].LG.values)
```

---

DATA OF DATAFRAME				
	ITEM	COMPANY	RUPEES	USD
0	TV	LG	12000	700
1	TV	VIDEOCON	10000	650
2	AC	LG	15000	800
3	AC	SONY	14000	750

---

DATA OF PIVOT			
COMPANY	LG	SONY	VIDEOCON
ITEM			
AC	15000	14000	NaN
TV	12000	NaN	10000

---

[ '12000' ]

## Sorting – DataFrame:-

Sorting means arranging the contents in ascending or descending order. There are two kinds of sorting available in pandas(Dataframe).

1. Byvalue(column)
2. Byindex

Sorting over dataframe column/s elements is supported by **sort\_values()** method. It could be done by single column or multiple columns, either in ascending order or in descending order.

Its syntax is:

```
dataframe.sort_values(by=columnname, axis=0, ascending=True, na_position='last')
```

Where

by – name of column(s) through which sorting is to be done

axis – 0 (for index) | 1 (for column)

ascending – True (for ascending order) | False (for descending order)

na\_position – first (to put NaNs at beginning) | last (to put NaNs at the end)

**Sort the python pandas Dataframe by multiplecolumnsin Descendingorderof first column and Ascending order of second column**



```

import pandas as pd

#Create a Dictionary of series
d =
{'Name':pd.Series(['Kapil','Amit','Virendra','Rohit','Ajinkya']),
'Age':pd.Series([26,27,25,24,31]),
'Score':pd.Series([87,47,67,55,47])}

#Create a DataFrame
df = pd.DataFrame(d)

print("Dataframe contents without sorting")
print(df)

df=df.sort_values(by=['Score','Age'],ascending=[F
alse,True])

print("Dataframe contents after sorting")
print(df)

```

## OUTPUT

```

Dataframe contents without sorting
   Name  Age  Score
0  Kapil   26    87
1   Amit   27    47
2 Virendra  25    67
3   Rohit   24    55
4  Ajinkya  31    47
Dataframe contents after sorting
   Name  Age  Score
0  Kapil   26    87
2 Virendra  25    67
3   Rohit   24    55
1   Amit   27    47
4  Ajinkya  31    47

```

## Data Aggregation –

Aggregation is the process of turning the values of a dataset (or a subset of it) into one single value or Data Aggregation in a multivalued function, which requires multiple values and return a single value as a result. There are number of aggregations possible like count, sum, min, max, median, quartile etc. Let us make this clear! If we have a DataFrame like the one below then a simple aggregation method is to calculate the summary of the Score, which is  $87+67+89+55+47= 345$  or a different aggregation method would be to count the number of Name, which is 5.

	Name	Age	Score
1	Kapil	26	87
2	Amit	27	89
3	Virat	25	67
4	Rohit	24	55
5	Ajinkya	31	47

It is also possible to get statistics on the entire data frame or a series (a column etc):

➤ `df.mean()` Returns the mean of all columns

- df.mode() Returns the mode of each element of columns
- df.sum() Returns the sum of all columns
- df.count() Returns the number of non-null values in each column
- df.max() Returns the highest value in each column
- df.min() Returns the lowest value in each column
- df.median() Returns the median of each column
- df.corr() Returns the correlation between columns in a data frame
- df.std() Returns the standard deviation of each column

Note: we can change the axis to calculate all above function row wise by passing argument as axis=1

Program to implement above functions:

#to implement aggregate functions on dataframe

```
import pandas as pd

d =
{'Name':pd.Series(['Sachin','Dhoni','Virat','Rohit','Shikhar']),
'Age':pd.Series([26,25,25,24,31]),
'Score':pd.Series([87,67,89,55,47])}

df= pd.DataFrame(d)

print("Dataframe contents")

print (df)

print()

print("sum-----\n",df.sum(numeric_only=True))

print("mean-----\n",df.mean())

print("median-----\n",df.median())

print("mode-----\n",df.mode())

print("count-----\n",df.count())

print("min---\n",df.min())

print("max---\n",df.max())
```

### OUTPUT

```
Dataframe contents
   Name  Age  Score
0  Sachin  26    87
1   Dhoni  25    67
2   Virat  25    89
3   Rohit  24    55
4  Shikhar  31    47

sum-----
Age      131
Score    345
dtype: int64
mean-----
Age      26.2
Score    69.0
dtype: float64
median-----
Age      25.0
Score    67.0
dtype: float64
mode-----
   Age  Score
0  25.0    47
1   NaN    55
2   NaN    67
3   NaN    87
4   NaN    89
count-----
Name      5
Age        5
Score      5
dtype: int64
min---
   Name  Dhoni
Age      24
Score     47
dtype: object
max---
   Name  Virat
Age      31
Score     89
dtype: object
```

## Quantile -

Quantile statistics is a part of a data set. It is used to describe data in a clear and understandable way. The 0.30 quantile is basically saying that 30 % of the observations in our data set is below a given line. On the other hand, it is also stating that there are 70 % remaining above the line we set.

### program on Quantile –

```
import pandas as pd
import numpy as np
df =pd.DataFrame(np.array([[1,1],[2,10],[3,100],
[4,1000]]),columns=['a', 'b']) print(df)
print(df.quantile(0.5))
```

```
OUTPUT
  a  b
0 1  1
1 2 10
2 3 100
3 4 1000
a  2.5
b  55.0
Name: 0.5, dtype: float64
```

**var()** – Variance Function in python pandas is used to calculate variance of a given set of numbers, Variance of a data frame.

```
print(df.var())
```

Output is :-

```
 a      1.666667
 b    233840.250000
dtype: float64
```

**mad()** – The mad() function is used to calculate the mean absolute deviation of the value for the requested axis. The mean Absolute Deviation (MAD) of a set of data is the average distance between each data value and the mean.

Syntax:-

```
<dataframe>.mad(axis=None,skipna=None)
```

Example

```
import pandas as pd
```

OUTPUT

```

disales={2016: {'qtr1':34500, 'qtr2':56000, 'qtr3':47000, 'qtr4':49000},
2017: {'qtr1':44900, 'qtr2':46100, 'qtr3':57000, 'qtr4':59000},
2018: {'qtr1':54500, 'qtr2':51000, 'qtr3':57000, 'qtr4':58500},
2019: {'qtr1':61000}}
sal_df=pd.DataFrame(disales)
print(sal_df)

print("MAD -----\\n",sal_df.mad())
print("MAD (with axis =1) -----\\n",sal_df.mad(axis=1))
print("MAD for one index-----\\n",sal_df.loc['qtr3',:].mad())

```

```

      2016  2017  2018  2019
qtr1 34500  44900  54500  61000.0
qtr2 56000  46100  51000      NaN
qtr3 47000  57000  57000      NaN
qtr4 49000  59000  58500      NaN
MAD -----
      2016    6062.5
      2017    6250.0
      2018    2500.0
      2019         0.0
dtype: float64
MAD (with axis =1) -----
      qtr1  9025.000000
      qtr2  3311.111111
      qtr3  4444.444444
      qtr4  4333.333333
dtype: float64
MAD for one index-----
      4444.444444444445

```

**std()** – The std() function is used to calculate the standard deviation of a given set of numbers, standard deviation of a data frame, Standard deviation of a data frame, standard deviation of column and standard deviation of rows

Example:-

```

import pandas as pd
disales={
2016: {'qtr1':34500, 'qtr2':56000, 'qtr3':47000, 'qtr4':49000},
2017: {'qtr1':44900, 'qtr2':46100, 'qtr3':57000, 'qtr4':59000},
2018: {'qtr1':54500, 'qtr2':51000, 'qtr3':57000, 'qtr4':58500},
2019: {'qtr1':61000}}
sal_df=pd.DataFrame(disales)
print("DataFrame-----\\n",sal_df)
print("STD -----\\n",sal_df.std())
print("STD with axis =1-----\\n",sal_df.std(axis=1))
print("STD for qtr3 to qtr4-----\\n",sal_df.loc['qtr3':'qtr4',:].std())

```

```

DataFrame-----
      2016  2017  2018  2019
qtr1 34500  44900  54500  61000.0
qtr2 56000  46100  51000      NaN
qtr3 47000  57000  57000      NaN
qtr4 49000  59000  58500      NaN
STD -----
      2016    8957.073555
      2017    7279.423054
      2018    3278.719262
      2019         NaN
dtype: float64
STD with axis =1-----
      qtr1  11561.538248
      qtr2  4950.084174
      qtr3   5773.502692
      qtr4   5634.713835
dtype: float64
STD for qtr3 to qtr4-----
      2016    1414.213562
      2017    1414.213562
      2018    1060.660172
      2019         NaN
dtype: float64

```

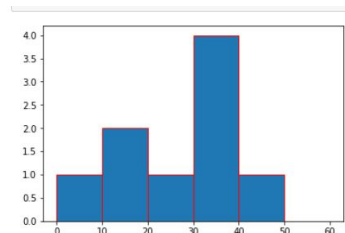
**Histogram:** A histogram is a plot that show the underlying frequency distribution of a set of continuous data. In pandas, hist() function is used to create histogram.

For Example:

```

import numpy as np
import matplotlib.pyplot as plt
data=[1,11,15,21,31,33,35,37,41]

```



```
plt.hist(data,bins=[0,10,20,30,40,50,60],edgecolor="red")
plt.show()
```

**Function Application:-**It means, that a function (a library function or user defined function) may be applied on a data frame in multiple ways:

**a. On the whole dataframe: pipe()**

The piping of function through pipe() basically means the chaining of function in the order they are executed.

Syntax:-

```
<dataframe>.pipe(func,*args)
```

Example:

#Program implementing nested pipe function

```
import pandas as pd
import numpy as np
#Create a Dictionary of series
```

```
Original Dataframe
science_marks  english_marks
0              20             89
1              50             87
2              60             67
3              80             55
4              40             47
Dataframe after applying pipe function with add, multiply and divide
science_marks  english_marks
0            15.0           35.7
1            24.0           35.1
2            27.0           29.1
3            33.0           25.5
4            21.0           23.1
```

```
d={'science_marks':pd.Series([20,50,60,80,40]),
'english_marks':pd.Series([89,87,67,55,47])}
df=pd.DataFrame(d)
print("Original Dataframe")
print(df)
df1=df.pipe(np.add,30).pipe(np.multiply,3).pipe(np.divide,10)
print("Dataframe after applying pipe function with add, multiply and divide")
print(df1)
```

**b. row-wise or column-wise: apply()**

The apply is a series function, so it applies the given function to one row or one column of the dataframe.

Syntax:

```
<dataframe>.apply(<funcname>,axis=0)
#Program implementing row wise apply function
```

```
import pandas as pd
```

```
Original Dataframe
science_marks  english_marks
0              22             89
1              55             87
2              63             67
3              85             55
4              47             47
Output after using apply function row wise
0            55.5
1            71.0
2            65.0
3            70.0
4            47.0
dtype: float64
```

```

import numpy as np
import math
d={'science_marks':pd.Series([22,55,63,85,47]),
  'english_marks':pd.Series([89,87,67,55,47])}
df= pd.DataFrame(d)
print("Original Dataframe")
print(df)
r=df.apply(np.mean,axis=1)
print("Output after using apply function row wise")
print(r)

```

**c. On individual elements i.e. element-wise: `applymap()`**

The `applymap()` is an element function, so it applies the given function to each individual element, separately – without taking into account other elements.

Syntax:-

```

<dataframe>.applymap(<funcname>)
#Program implementing applymap function

```

```

import pandas as pd
import numpy as np
import math
d={'science_marks':pd.Series([22,55,63,85,47]),
  'english_marks':pd.Series([89,87,67,55,47])}
df= pd.DataFrame(d)
print("Original Dataframe")
print(df)
r=df.applymap(lambda x:x+2)
print("Output after using applymap function")
print(r)

```

Original Dataframe

	science_marks	english_marks
0	22	89
1	55	87
2	63	67
3	85	55
4	47	47

Output after using applymap function

	science_marks	english_marks
0	24	91
1	57	89
2	65	69
3	87	57
4	49	49

**groupby()** – The `groupby()` function rearrange data into groups based on some criteria and stores the rearranged data in a new `groupby` object. To display the groups we should store this new object in a variable then use the following attributes and functions with this

variable.

Syntax

```
<dataframe>.groupby(by=None,axis=0)
```

For example:

# IMPLEMENTING GROUPBY()

import pandas as pd

ipl\_data = {'Team': ['Riders', 'Riders', 'Devils', 'Devils', 'Kings',

'kings', 'Kings', 'Kings', 'Riders', 'Royals', 'Royals', 'Riders'],

'Rank': [1, 2, 2, 3, 3,4 ,1 ,1,2 , 4,1,2],

'Year': [2014,2015,2014,2015,2014,2015,2016,2017,2016,2014,2015,2017],

'Points':[876,789,863,673,741,812,756,788,694,701,804,690]}

df = pd.DataFrame(ipl\_data)

print("Original DataFrame")

print(df)

print()

```
Groups are:---
{'Devils': Int64Index([2, 3], dtype='int64'), 'Kings': Int64Index([4, 6, 7], dtype='int64'),
'Riders': Int64Index([0, 1, 8, 11], dtype='int64'), 'Royals': Int64Index([9, 10],
dtype='int64'), 'kings': Int64Index([5], dtype='int64')}
```

gdf=df.groupby('Team')

print("Groups are:---\n",gdf.groups)

print()

print("groups on the basis of riders:---

\n",gdf.get\_group('Riders'))

print("group size-----\n",gdf.size())

print("group count-----\n",gdf.count())

Original DataFrame

	Team	Rank	Year	Points
0	Riders	1	2014	876
1	Riders	2	2015	789
2	Devils	2	2014	863
3	Devils	3	2015	673
4	Kings	3	2014	741
5	kings	4	2015	812
6	Kings	1	2016	756
7	Kings	1	2017	788
8	Riders	2	2016	694
9	Royals	4	2014	701
10	Royals	1	2015	804
11	Riders	2	2017	690

groups on the basis of riders:---

	Team	Rank	Year	Points
0	Riders	1	2014	876
1	Riders	2	2015	789
8	Riders	2	2016	694
11	Riders	2	2017	690

group size-----

Team	Rank	Year	Points
Devils	2		
Kings	3		
Riders	4		
Royals	2		
kings	1		

group count-----

Team	Rank	Year	Points
Devils	2	2	2
Kings	3	3	3
Riders	4	4	4
Royals	2	2	2
kings	1	1	1

**Aggregate functions** can also be applied on the groupby object using agg(). It returns a reduced version of the data by producing one summary result per group.

For example:

#in continuation of previous program

print("mean median and mode")

print(gdf.agg([np.mean,np.sum]))

	mean	median	and mode	Rank	Year	Points	sum
Team	mean	sum		mean	sum	mean	sum
Devils	2.500000	5	2014.500000	4029	768.000000	1536	
Kings	1.666667	5	2015.666667	6047	761.666667	2285	
Riders	1.750000	7	2015.500000	8062	762.250000	3049	
Royals	2.500000	5	2014.500000	4029	752.500000	1505	
kings	4.000000	4	2015.000000	2015	812.000000	812	

Transform

	Team	Rank	Year	Points	Mean_Rank
0	Riders	1	2014	876	1.750000
1	Riders	2	2015	789	1.750000
2	Devils	2	2014	863	2.500000
3	Devils	3	2015	673	2.500000
4	Kings	3	2014	741	1.666667
5	kings	4	2015	812	4.000000
6	Kings	1	2016	756	1.666667
7	Kings	1	2017	788	1.666667
8	Riders	2	2016	694	1.750000
9	Royals	4	2014	701	2.500000
10	Royals	1	2015	804	2.500000
11	Riders	2	2017	690	1.750000

**The transform() function** transforms the aggregate data by repeating the summary result for each row of the group and makes the result have the same shape as original data.

For example:

```
#in continuation of previous program
print("Transform")
df['Mean_Rank']=gdf['Rank'].transform(np.mean)
print(df)
```

## **Reindexing and Altering Labels**

The methods provided by Pandas for reindexing and relabeling are:

(i) **rename()**: A method that simply renames the index and/or column label in a dataframe.

Syntax:-

```
<dataframe>.rename(mapper=None, axis=None, inplace=False)
<dataframe>.rename(index=None, columns=None, inplace=False)
```

**mapper, index, columns: dictionary like**

axis: int (0 or 1)

inplace boolean default false, returns new dataframe with renamed

index/labels, if true then changes are made in the current dataframe

```
df.rename(index={'qtr1':1,'qtr2':2,'qtr3':3,'qtr4':4})
```

```
df.rename(index={'qtr1':1,'qtr2':2,'qtr3':3,'qtr4':4},inplace=True)
```

(ii) **reindex()**: A method that can specify the new order of existing indexes and column labels, and/or also create new indexes/column labels.

Syntax:-

```
<dataframe>.reindex(labels=None, axis=None, fill_value=nan)
```

```
<dataframe>.reindex(index=None, columns=None,fill_value=None)
```

labels,index,columns: arraylike

axis: int (0 or 1)

fill\_value the value to be filled in the newly added

**(a) Reordering the existing indexes using reindex()**

```
df.reindex(['qtr4','qtr1','qtr3','qtr2'])
```

```
df.rename(index=['qtr4','qtr1','qtr3','qtr2'])
```

**(b) Reordering as well as adding/deleting indexes/labels**



```
df.reindex([2019,2018,2017,2016,2015,2014],axis=1)
```

**(c) Specifying fill values for new**

```
rows/columnsdf.reindex(columns=[2019,2017,2015],f  
ill_value=5000)
```

(iii) **reindex\_like()**: A method for creating indexes/column\_labels based on other dataframe object.

Syntax:-

```
<dataframe>.reindex_like(other)
```

other: Name of a dataframe as per which current <dataframe> is to reindexed.

```
df.reindex_like(sa_df)
```

**Short Answer Type Question:**

1. What is max()?	2. What is min()?	3. What is sum()?	4. What is count()?
5. What is mode()?	6. What is mean()?	7. What is median()?	8. What is var()?
9. What is quantile()?	10. What is pipe()?	11. What is apply()?	12. What is groupby()?
13. What is transform()?	14. What is the significance of Pandas library?		

**Long Answer/Practical based questions**

- 1) How is series data structure different from a dataframe datastructure?
- 2) Write a Python code to create an empty dataframe?
- 3) Write a Python code to drop a dataframe?
- 4) How is reindexing and relabelling useful in dataframes?
- 5) Write Python code to create a dataframe for employee data (empno, ename, salary) and sort the dataframe first by salary in descending order then by empno.
- 6) Generate histogram on the basis of dataframe exam\_data.
- 7) Write a Python code to count the number of rows and columns of a dataframe for student data (Stno, Sname, Age, Class).

**NumPy:** NumPy stands for Numerical Python. It is the core library for scientific computing in Python. It consists of multidimensional array objects, and tools for working with these arrays.

## 1-D ARRAY

Creation of 1D array

One dimension array can be created using array method which lists object with one dimensional elements.

e.g. program

#Creating 1 D array in different styles:

```
import numpy as np
a = np.array([500,12,30])
print(np.rank)
print("Array a=",a)
print("Shape of a=",a.shape)
b= np.empty(5)
c=np.zeros(7)
d=np.ones(4)
e=np.random.random(4)
f=np.full(5,3)
print("Empty array=", b)
print("Array of Zeros=",c)
print("Array of ones=",d)
print("Array of random
numbers=",e)
print("Full array with one value=",f)
g=np.arange(4)
h=np.arange(5,20,3)
print("Array with arange()=",g)
print("Array with arange() with step 3=",h)
#copy of array
i=a
j=np.copy(a)
i[0]=10 #changing 1st element in copy of array
print("Copy of a using assignmet operator=",i)
print("a=",a)
print("Copy of a using copy()=",j)
```

```
<function rank at 0x0000000005357E18>
Array a= [500 12 30]
Shape of a= (3,)
Empty array= [42436. 5776. 50176. 1296. 8836.]
Array of Zeros= [0. 0. 0. 0. 0. 0.]
Array of ones= [1. 1. 1. 1.]
Array of random numbers= [0.19185422 0.40278503 0.1874477 0.26583084]
Full array with one value= [3 3 3 3 3]
Array with arange()= [0 1 2 3]
Array with arange() with step 3= [ 5  8 11 14 17]
Copy of a using assignmet operator= [10 12 30]
a= [10 12 30]
Copy of a using copy()= [500 12 30]
```

## 2-D ARRAY

### Creation of 2D array

Two dimension array can be created using array method with list object with two dimensional elements.

```
import numpy as np
a = np.array([[13, 5, 1],[1, 2, 3]])
print(type(a))
print(a.shape)
print(a[0][2])
a[0][1] = 50
print(a)
```

OUTPUT

```
# Create a 2D Array
# Prints "<class 'numpy.ndarray'>"
# Prints (2, 3)
# Prints 2
# Change an element of the array
# prints [[13 5 50] [ 1 2 3]]
```

### Creation of 2D array from 1D array

We can create 2D array from 1d array using reshape() function.

e.g. program

```
import numpy as np
A = np.array([11,22,33,44,55,66])
B = np.reshape(A, (2, 3))
print(B)
```

OUTPUT

```
[[11 22 33]
 [44 55 66]]
```



### Slicing:

It refers to the process of extracting a subset of elements from an existing array and return the result as another array, possibly in different dimension from the original.

#### Syntax for 1D array slicing:

**Arrayname[start:stop:step]**

#### Syntax for 2D array slicing:

**Arrayname[start:stop:step, start:stop:step]**

#### Note:

1. When start ,stop or step is not provided then python assumes the following values:  
start=0 ; stop = dimension ; step = 1

2. Negative step value means reversed order of elements.

For example:

#implementing slicing

```
import numpy as np
a = np.array([[1,2,3],[4,5,6],[7,8,9]])
```

```
a
[[1 2 3]
 [4 5 6]
 [7 8 9]]
a1
[[2 3]
 [5 6]
 [8 9]]
a2
[[4]
 [7]]
a3
[[1 2]
 [4 5]]
```

```

a1=a[:3,1:3]
a2=a[1:3,:1]
a3=a[:2,:2]
print("a\n",a)
print("a1\n",a1)
print("a2\n",a2)
print("a3\n",a3)

```

### Subset of Arrays:

To get contiguous subset numpy provides three functions: `split()`, `hsplit()`, `vsplit()`.

The **`hsplit()`** and **`vsplit()`** functions split the arrays horizontally and vertically respectively.

Their syntax are:

```

np.hsplit(arrayname,n)
np.vsplit(arrayname,n)

```

where `n` is the number of division in the given array, and the array must be equally divisible in `n` parts, otherwise gives error.

The **`split()`** function allows to split the array either vertically or horizontally. And it also allows non-equal subarrays.

For example:

```

#implementing hsplit(),vsplit() and split()
import numpy as np
a = np.array([[1,2,3],[4,5,6],[7,8,9]])
print("Output of hsplit()")
print(np.hsplit(a,3))
print("Output of vsplit()")
print(np.vsplit(a,3))
print("Output of split()")
print(np.split(a,[1,3])) # split works 0:1, 1:3, 3:

```

Output of `hsplit()`

```

[array([[1],
       [4],
       [7]]), array([[2],
       [5],
       [8]]), array([[3],
       [6],
       [9]])]

```

Output of `vsplit()`

```

[array([[1, 2, 3]]), array([[4, 5, 6]]), array([[7, 8, 9]])]

```

Output of `split()`

```

[array([[1, 2, 3]]), array([[4, 5, 6],
       [7, 8, 9]]), array([], shape=(0, 3), dtype=int32)]

```

### Arithmeticoperation

Operation over 2d array is possible with `add`,`subtract`,`multiply`,`divide ()` functions.

E.G.PROGRAM

```

import numpy as np
a = np.array([[71,25,29],[22,26,28]])
print(a)
b = np.array([10,10,10])

```

OUTPUT  
[[7 5 9]  
[2 6 8]]

```

c=np.add(a,b) # c=a+b, similar
print(c) → [[17 1519]
            [12 1618]]
c=np.subtract(a,b) # c=a-b, similar
print(c)
c=np.multiply(a,b) # c=a*b, similar
print(c) → [[-3 -5-1]
            [-8 -4-2]]
c=np.divide(a,b) # c=a/b, similar
print(c) → [[70 50 90]
            [20 60 80]]
Note:-
          [[0.7 0.5 0.9]
           [0.2 0.6 0.8]]

```

1. If both 2D arrays are with same dimension [matrix form] then one to one arithmetic operation will be performed.
2. No. of elements of a dimension must match otherwise error message thrown.

### Creating array by specifying own data type-

```

>>> l=[1,2,3,4]
>>> ar=np.array(l,dtype=np.int64)
>>> ar
array([1, 2, 3, 4], dtype=int64)
>>>

```

## 2 D ARRAY JOINING

### e. g. program

```

import numpy as np
A = np.array([[7,5],[1,6]])
# concatenate along the first axis
print(np.concatenate([A, A])) → OUTPUT
# concatenate along the second axis(zero-indexed)
[[7 5]
 [16]
 [75]
 [1 6]]

print(np.concatenate([A, A], axis=1)) → [[7 5 7 5]
x = np.array([1, 2]) → [1 6 1 6]]

# vertically stack the arrays
print(np.vstack([x, A])) → [[1 2]
# horizontally stack the arrays → [7 5]
[1 6]]

```

```
y = np.array([[99],[99]])
print(np.hstack([A, y]))
```



```
[[7 5 99]
 [1 6 99]]
```

## COVARIANCE:

It tells how similar/ varying two data sets are. A high positive covariance between two datasets means they are strongly similar. A high negative covariance means they are very dissimilar. In numpy cov() function is used to perform this operation.

Syntax:

```
np.cov(arr1,arr2)
```

### e.g. program

```
import numpy as np
a = np.array([1000,1200,1600])
b = np.array([130,110,120])
Cov=np.cov(a,b)
print("Covariance Matrix is --\n",Cov)
print("Covariance",Cov[0][0])
```

```
Covariance Matrix is --
[[93333.33333333 -1000.    ]
 [-1000.         100.     ]]
Covariance 93333.33333333334
```

## CORRELATION

Correlation is normalised covariance. It is dimensionless. In other words, the correlation coefficient is always a pure value and not measured in any units. It gives two values: 1 if data set have positive covariance and -1 if dataset have negative covariance. In numpy corrcoef() function is used to perform this operation.

Syntax:

```
np.corrcoef(arr1,arr2)
```

### e.g.program

```
import numpy as np
a = np.array([1000,1200,1600])
b = np.array([130,110,120])
Cov= np.corrcoef(a, b)
print("Correlation Matrix is --\n",Cov)
print("Correlation of a and b is:",Cov[0][0])
```

```
Correlation Matrix is --
[[ 1.         -0.32732684]
 [-0.32732684  1.         ]]
Correlation of a and b is: 1.0
```

**Note: Both array must have the same shape for calculating correlation**

## Linear Regression

Linear regression is a method used to find a relationship between a

dependent variable and independent variable(s). Types 1. Simple Linear Regression: There is only one independent variable in it. eg. the price of the house depends only one field that is the size of the plot. 2. Multiple Linear Regression: There is more independent variable in it eg. the price of the house depends one field that is the size of the plot and number of rooms.

Linear Equation:  $Y=aX + b$  a: Slope of the line

b: Constant (Y-intercept, where  $X=0$ )

X: Independent variable

Y: Dependent variable

### E.g. program

```
import numpy as np
```

```
import matplotlib.pyplot as plt
```

```
def estcoefficients(x,y):
```

```
    n=np.size(x)
```

```
    meanx, meany = np.mean(x), np.mean(y)
```

```
    sy = np.sum(y*x - n*meany*meanx)
```

```
    sx = np.sum(x*x - n*meanx*meanx)
```

```
    a=sx/sy b=meany-a*meanx
```

```
    return(a,b)
```

```
def plotregline(x,y,b):
```

```
    plt.scatter(x,y,color="r",marker="o",s=30)
```

```
    ypred=b[0]+b[1]*x plt.plot(x,ypred,color="g")
```

```
    plt.xlabel('SIZE')
```

```
    plt.ylabel('COST')
```

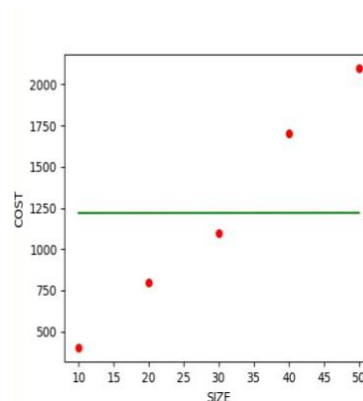
```
    plt.show()
```

```
    x=np.array([10,20,30,40,50]) # independent variable
```

```
    y=np.array([400,800,1100,1700,2100]) # dependent variable
```

```
    b=estcoefficients(x,y)
```

```
    plotregline(x,y,b)
```



### **Reindexing and Altering Labels**

The methods provided by Pandas for reindexing and relabeling are

(i) **rename()**: A method that simply renames the index and/or column label in a dataframe.

Syntax:-

```
<dataframe>.rename mapper=None, axis=None, inplace=False)
```

```
<dataframe>.rename(index=None, columns=None, inplace=False)
```

**mapper, index, columns: dictionary like**

axis: int (0 or 1)

inplace boolean default false, returns new dataframe with renamed index/labels, if true

then changed are made in the current dataframe

```
df.rename(index={'qtr1':1,'qtr2':2,'qtr3':3,'qtr4':4})
```

```
df.rename(index={'qtr1':1,'qtr2':2,'qtr3':3,'qtr4':4},inplace=True)
```

(ii) **reindex():** A method that can specify the new order of existing indexes and column labels, and/or also create new indexes/column labels.

Syntax:-

```
<dataframe>.reindex(lables=None, axis=None, fill_value=nan)
```

```
<dataframe>.reindex(index=None, columns=None, fill_value=None)
```

labels, index, columns: array like

axis: int (0 or 1)

fill\_value the value to be filled in the newly added

**(a) Reordering the existing indexes using reindex()**

```
df.reindex(['qtr4','qtr1','qtr3','qtr2'])
```

```
df.rename(index=['qtr4','qtr1','qtr3','qtr2'])
```

**(b) Reordering as well as adding/deleting indexes/labels**

```
df.reindex([2019,2018,2017,2016,2015,2014],axis=1)
```

(c) Specifying fill values for new rows/columns

```
df.reindex(columns=[2019,2017,2015],fill_value=5000)
```

(iii) **reindex\_like():** A method for creating indexes/column\_labels based on other dataframe object.

Syntax:-

```
<dataframe>.reindex_like(other)
```



other: Name of a dataframe as per which current <dataframe> is to reindexed.

`df.reindex_like(sal_df)`

### Short answer:

1. Why are NumPy arrays used overlists?
2. Write a NumPy program to get the NumPyversion.
3. Write short notes on:
  - Joins in Arrays
  - Array Slicing
  - Array Subset
4. How can we create Boolean array?
5. Write a NumPy program to extract all odd numbers from an array.
6. Write difference between Covariance & Correlation.

### Long Answer:

1. Write a program to plot linear regression for the given two data set using best-fitted line method.

X	Y
0.2	3.3
1.3	3.9
2.1	4.8
2.9	5.5
3.3	6.9

2. Why is a variance-covariance matrix in Python useful?
3. Write a program to extract and copy the first 2 rows of a 2D array to a 1D array.

## What is Data Visualization

Data visualization is the technique to present the data in a pictorial or graphical format. It enables stakeholders and decision makers to analyze data visually. The data in a graphical format allows them to identify new trends and patterns easily.

The main benefits of data visualization are as follows:

- It simplifies the complex quantitative information
- It helps analyze and explore big data easily
- It identifies the areas that need attention or improvement
- It identifies the relationship between data points and variables
- It explores new patterns and reveals hidden patterns in the data

## Using Pyplot of MATPLOTLIB Library

- The matplotlib is a python library that provides many interfaces functionally for 2D graphics similar to MATLAB's in various form.
- In short we can call matplotlib as a high quality plotting library of Python.
- The matplotlib library offers many different named collections of methods, PyPlot is one such interface.
- PyPlot is a collection of methods within matplotlib which allows user to construct 2D plots easily and interactively.

### Importing PyPlot

To import Pyplot following syntax is

```
import matplotlib.pyplot
```

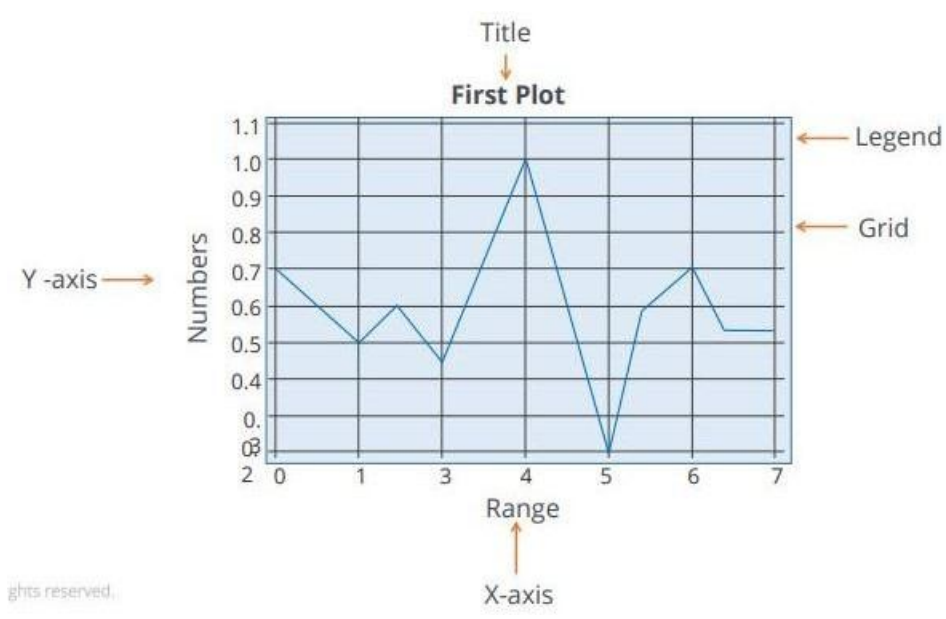
or

```
import matplotlib.pyplot as pl
```

After importing matplotlib in the form of pl we can use pl for accessing any function of matplotlib.

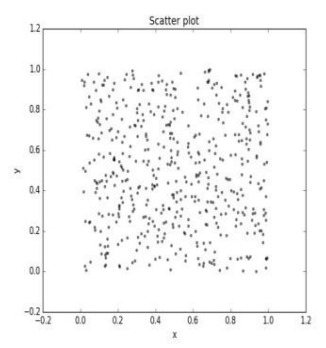
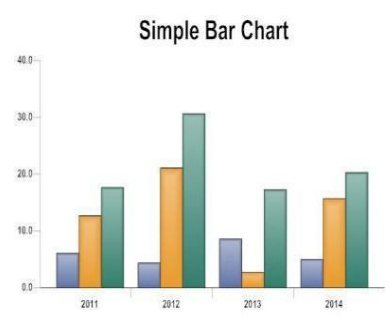
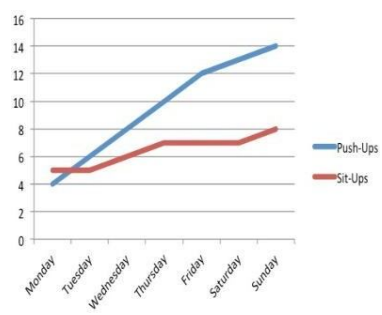
We can create a plot using four simple steps:-

1. Import the required libraries
2. Define or import the required dataset
3. Set the plot parameters
4. Display the created plot



Following chart types

- Linechart
- BarChart
- ScatterPlot

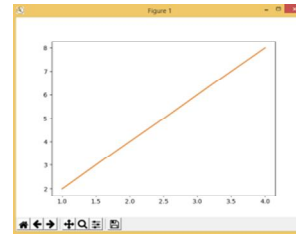


**Line Chart using plot function ()**

- A line chart or line graph is a type of chart which displays information as a series of data points called markers connected by straight line segments.

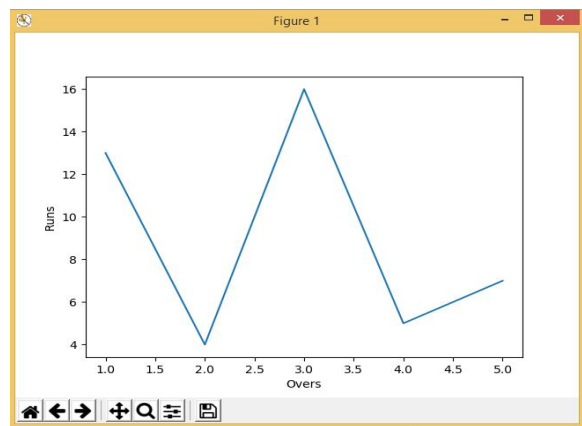
The example codes given below to understand the working of plot().

```
>>> import matplotlib.pyplot as plt
>>> a=[1,2,3,4]
>>> b=[2,4,6,8]
>>> plt.plot(a,b)
```



In the next example we take data from a cricket match where runs of 5 overs are given. We place name of X axis as overs and name of Y axis as runs.

```
import matplotlib.pyplot as plt
over = [1,2,3,4,5]
run = [13,4,16,5,7]
plt.xlabel("Overs")
plt.ylabel("Runs")
plt.plot(over,run)
plt.show()
```

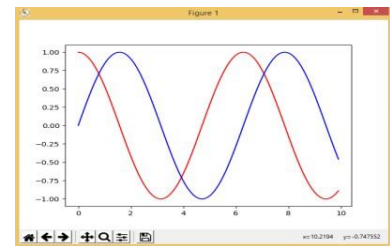


### Change of Line color, width and style

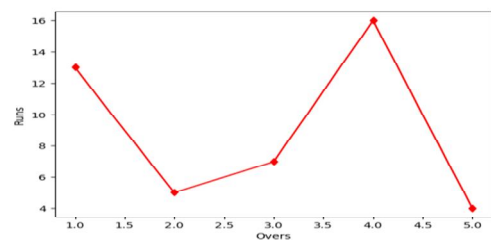
We can use following syntax -

matplotlib.pyplot.plot(<data1>,<data2>,<color code>)

```
import matplotlib.pyplot as plt
import numpy as np
x=np.arange(0,10,0.1)
a=np.cos(x)
b=np.sin(x)
plt.plot(x,a,'r')
plt.plot(x,b,'b')
plt.show()
```



character	color
'b'	blue
'g'	green
'r'	red
'c'	cyan
'm'	magenta
'y'	yellow
'k'	black
'w'	white



## Change of Marker type, size and color

Use following -

`matplotlib.pyplot.plot(<data1>,<data2>,linestyle=<val>...)`

'p'	pentagon marker
'*'	star marker
'h'	hexagon1 marker
'H'	hexagon2 marker
'+'	plus marker
'x'	x marker
'D'	diamond marker
'd'	thin_diamond marker
' '	vline marker
'_'	hline marker

```
import matplotlib.pyplot as plt
over=[1,2,3,4,5]
run=[13,5,7,16,4]
plt.xlabel("Overs")
plt.ylabel("Runs")
plt.plot(over,run,'r',marker='d', markersize=6,markeredgecolor='red')
plt.show()
```

The scatter chart is a graph of plotted points on two axes that show the relationship between two sets of data.

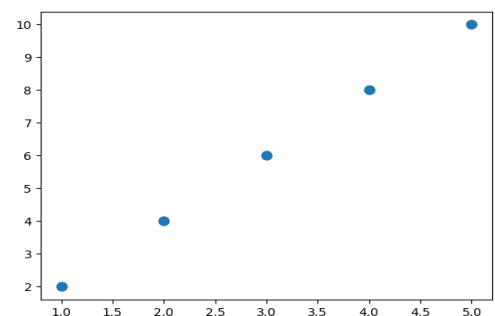
The scatter charts can be created through two functions of pyplot library:

- `plot()` function
- `scatter()` function

**Syntax of `plot()` function is –**

`matplotlib.pyplot.plot(a,b,<point style >, markersize=<value>)`

```
import matplotlib.pyplot as plt
a=[1,2,3,4,5]
b=[2,4,6,8,10]
plt.plot(a,b,"o",markersize=8)
plt.show()
```

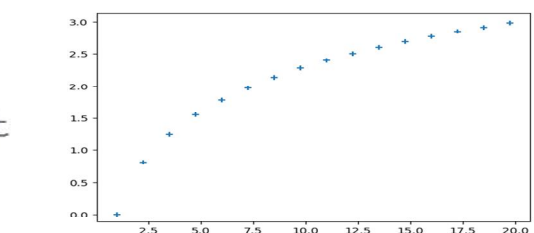


Creating Scatter Chart

**Syntax of `scatter()` function –**

`matplotlib.pyplot.scatter(a, b, marker=<type>)`

```
import matplotlib.pyplot as plt
import numpy as np
a=np.arange(1,20,1.25)
b=np.log(a)
plt.scatter(a,b,marker="+")
plt.show()
```

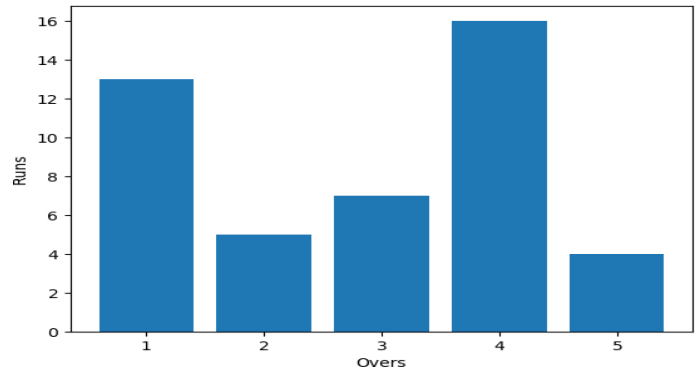


## Bar Chart:-

A Bar Graph / Chart is a graphical display of data using bars of different heights.

syntax – `matplotlib.pyplot.bar(a,b)`

```
import matplotlib.pyplot as plt
over=[1,2,3,4,5]
run=[13,5,7,16,4]
plt.xlabel("Overs")
plt.ylabel("Runs")
plt.bar(over,run)
plt.show()
```



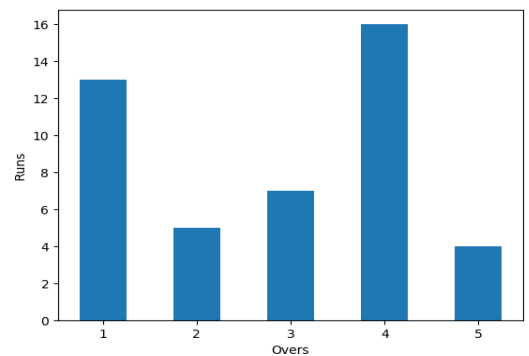
### Changing widths of the Bars in a Bar Chart

To specify common width (other than the default width) for all bars we can specify width argument having a scalar float value in the `bar()` function.

syntax –

`matplotlib.pyplot.bar(a, b, width=<Value>)`

```
import matplotlib.pyplot as plt
over=[1,2,3,4,5]
run=[13,5,7,16,4]
plt.xlabel("Overs")
plt.ylabel("Runs")
plt.bar(over,run,width=1/2)
plt.show()
```

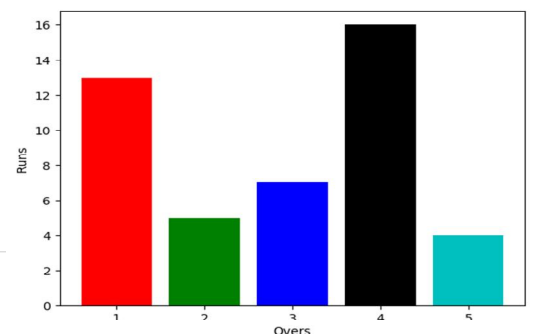


To specify common color (other than the default color) for all bars we can specify color argument having a valid color code/name in the `bar()` function.

Syntax –

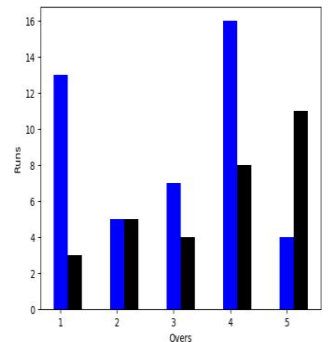
`matplotlib.pyplot.bar(a, b, color=<code>)`

```
import matplotlib.pyplot as plt
over=[1,2,3,4,5]
run=[13,5,7,16,4]
plt.xlabel("Overs")
plt.ylabel("Runs")
plt.bar(over,run,color=['r','g','b','k','c'])
plt.show()
```

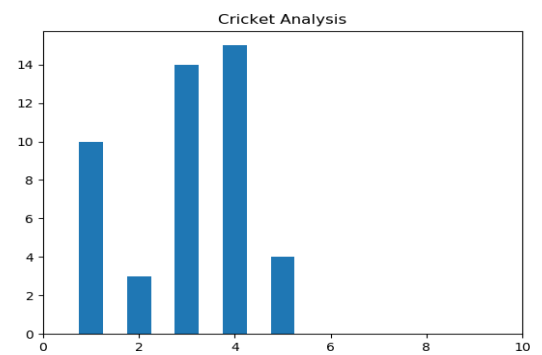


## Creating Multiple Bar Chart

```
import matplotlib.pyplot as pl
import numpy as np
over=np.arange(1.0,6.0,1.0)
Ind=[13,5,7,16,4]
Nz=[3,5,4,8,11]
pl.xlabel("Overs")
pl.ylabel("Runs")
pl.bar(over,Ind,color='b',width=0.25)
pl.bar(over+0.25,Nz,color='k',width=0.25)
pl.show()
```

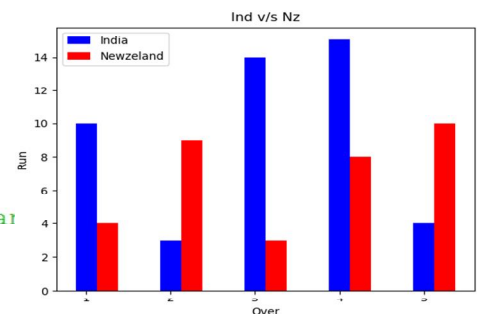


```
import matplotlib.pyplot as pl
import numpy as np
over=[1,2,3,4,5]
run=[10,3,14,15,4]
pl.xlim(0,10)
pl.title("Cricket Analysis")
pl.bar(over,run,width=1/2)
pl.show()
```



## Adding Legends

```
import matplotlib.pyplot as pl
import numpy as np
over=np.arange(1.0,6.0,1.0)
ind=[10,3,14,15,4]
nz=[4,9,3,8,10]
pl.title("Ind v/s Nz")
pl.bar(over,ind,color='b',width=0.25,label='India')
pl.bar(over+0.25,nz,color='r',width=0.25,label='Newzeland')
pl.legend(loc='upper left')
pl.xlabel("Over")
pl.ylabel("Run")
pl.show()
```



## Saving a Graph in a local disk:-

```
import matplotlib.pyplot as pl
import numpy as np
over=np.arange(1.0,6.0,1.0)
ind=[10,3,14,15,4]
nz=[4,9,3,8,10]
pl.title("Ind v/s Nz")
pl.bar(over,ind,color='b',width=0.25,label='India')
pl.bar(over+0.25,nz,color='r',width=0.25,label='Newzeland')
pl.legend(loc='upper left')
pl.xlabel("Over")
pl.ylabel("Run")
pl.savefig("C:\\MyData\\myfig.png")
pl.show()
```

### Check Point:-

1. Which of the following is not a valid plotting function of pyplot?.

- a. Plot()
- b.bar()
- c. line()
- d.pie()

Ans:-c

2. Which of the following plotting functions does not plot multiple dataservices?.

- a.plot()
- b. bar()
- c.pie()
- d.barh()

Ans:-pie()

3. Name the function you will use to create a horizontal barchart.

Ans:-barh()

4. What is Marker? How can you change the marker type and colour in a plot ?.

Ans:- Data points being plotted are called markers.

Change of Marker type, size and color use following -

```
matplotlib.pyplot.plot(<data1>,<data2>,linestyle=<val>...)
```

5. What is the use of **loc** argument in a legend()function.

Ans:- It specifies the keyword argument loc determines where the legend will be placed in a graph, which by default is 1 or "upper right".

6. Compare bar() and barh()functions.

Ans:- A bar graph displays the values in a vector or matrix as horizontal or vertical bars. A barh graph displays the values in a vector or matrix as horizontal bars.

7. A Data Frame pdas:

	1990	2000	2010
1.	54	345	895
2.	64	485	562
3.	79	690	1100
4.	96	770	890

Write Code to Create:-



- (a) A scatter chart from 1990 and 2010 of data framepd.
- (b) A line chart from the 1990 and 2000 of data framepd.
- (c) A bar chart to plotting the three columns of data framepd.

Ans:-(a) `import matplotlib.pyplot as pl`

`import pandas as pd`

`data = {'1990':[54,64,79,96],'2000':[345,485,690,770],'2010':[895,562,1100,890]}`

`d = pd.DataFrame(data,columns={'1990','2000','2010'})`

`pl.scatter(d['1990'],d['2010'])`

`pl.show()`

(b) `import matplotlib.pyplot as pl`

`import pandas as pd`

`data = {'1990':[54,64,79,96],'2000':[345,485,690,770],'2010':[895,562,1100,890]}`

`d = pd.DataFrame(data,columns={'1990','2000','2010'})`

`pl.plot(d['1990'],d['2000'])`

`pl.show()`

(c) `import matplotlib.pyplot as pl`

`import pandas as pd`

`data = {'1990':[54,64,79,96],'2000':[345,485,690,770],'2010':[895,562,1100,890]}`

`d = pd.DataFrame(data,columns={'1990','2000','2010'})`

`pl.bar(d['1990'],d['2000'],d['2010'])`

`pl.show()`

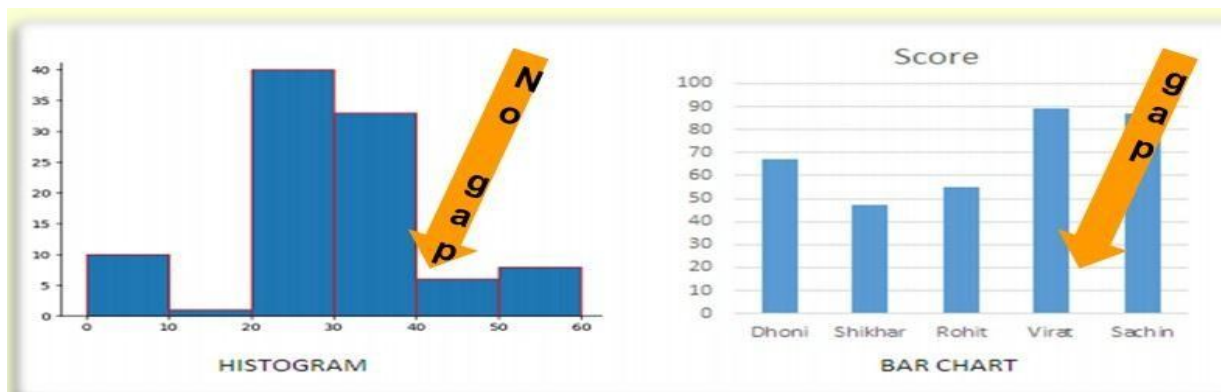
## Histogram:-

A histogram is a powerful technique in data visualization. It is an accurate graphical representation of the distribution of numerical data. It was first introduced by Karl Pearson.

It is an estimate of the distribution of a continuous variable (quantitative variable). It is similar to a bar graph. To construct a histogram, the first step is to “bin” the range of values—means divide the entire range of values in to a series of intervals—and then count how many values fall into each interval. The bins are usually specified as consecutive, no over lapping intervals of a variable. The bins(intervals) must be adjacent, and are often (but are not required to be) of equal size.

### Difference between a histogram and a bar chart / graph –

A bar chart majorly represents categorical data (data that has some labels associated with it), they are usually represented using rectangular bars with lengths proportional to the values that they represent. While histograms on the other hand, is used to describe distributions. Given a set of data, what are their distributions?



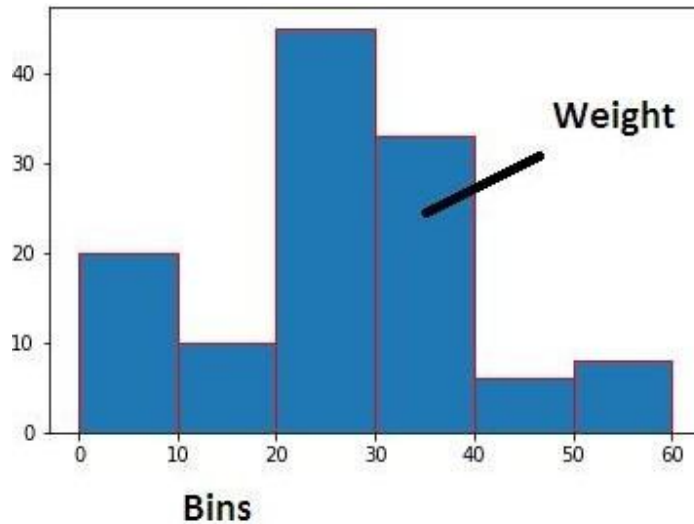
There are various ways to create histogram in python pandas. One of them is using matplotlib python library. Using this library we can easily create histogram. We have to write just few statements to create histogram.

**Program in python. Develop a python program with the code below and execute it.**

```
import numpy as np
import matplotlib.pyplot as plt
data = [1,11,21,31,41]
```

```
plt.hist([5,15,25,35,45, 55], bins=[0,10,20,30,40,50, 60],
weights=[20,10,45,33,6,8], edgecolor="red")
plt.show()
```

Output:-

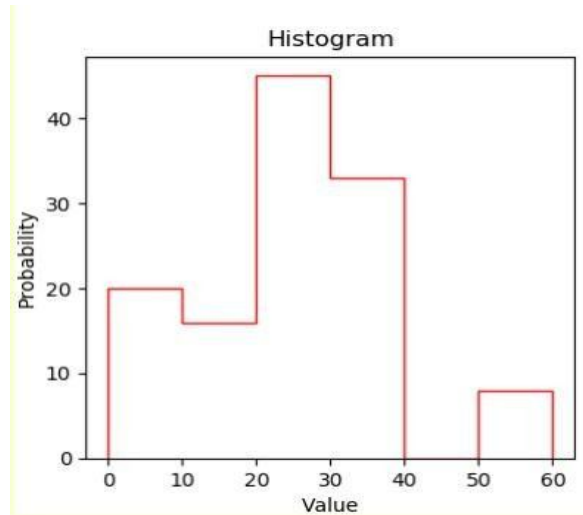


### Frequency polygons:-

A frequency polygon is a type of frequency distribution graph. In a frequency polygon, the number of observations is marked with a single point at the midpoint of an interval.

```
import numpy as np
import matplotlib.pyplot as plt
data = [1,11,21,31,41]
plt.hist([5,15,25,35,15, 55], bins=[0,10,20,30,40,50, 60], weights=[20,10,45,33,6,8],
edgecolor="red", histtype='step')
plt.xlabel('Value')
plt.ylabel('Probability')
plt.title('Histogram')
plt.show()
```

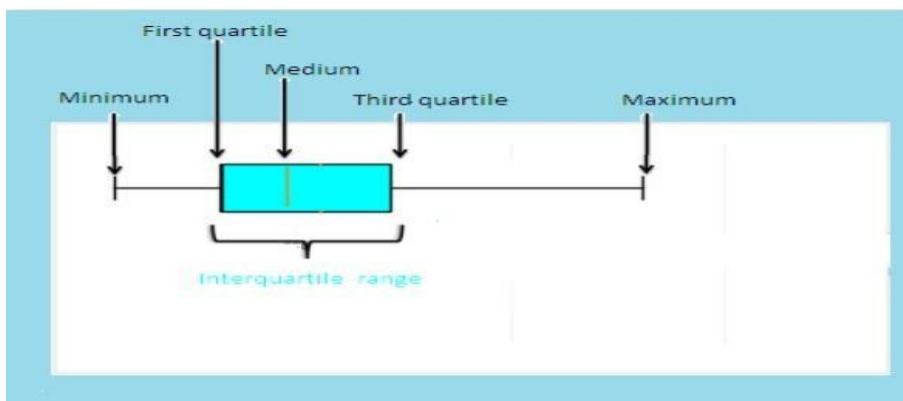
Output is:-



## Box Plots:-

A Box Plot is the visual representation of the statistical five number summary of a given data set. A Five Number Summary includes:

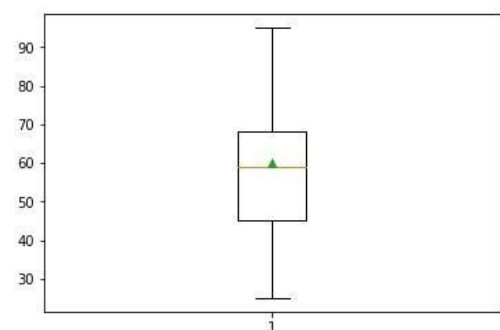
- Minimum
- FirstQuartile
- Median (Second Quartile)
- ThirdQuartile
- Maximum



1. Draw the boxplot from the following data:-  
25,42,63,45,59,56,87,68,95

Ans:-

```
import matplotlib.pyplot as plt
Data=[25,42,63,45,59,56,87,68,95]
plt.boxplot(Data,showmeans=True)
plt.show()
```



2. Which function of Pyplot can you plot histograms?

Ans:- hist()

3. What is the use of boxplot?

Ans:- A box plot or boxplot is a method for graphically depicting groups of numerical data through their quartiles

---

## UNIT: - 2

### Software Engineering

**Software Engineering** is a systematic approach to the design, development, operation, and maintenance of a software system.

Software Engineering is very important for the development of software because of the following reasons:-

- (i) Correct Specifications
- (ii) Scalability Scope
- (iii) Cost Control
- (iv) Quality

### Software process

A software process (also known as software methodology) is a set of related activities that leads to the production of the software. These activities may involve the development of the software from the scratch, or modifying an existing system.

The Software processes are also known as Software Development Life Cycle(SDLC).

Any software process must include the following four activities:

- 1. Software specification (or requirements engineering):**
  - 2. Software design and implementation:**
  - 3. Software verification and validation:**
  - 4. Software maintenance:**
-

## **Software Process Models**

A software process model is a simplified representation of a software process.

Each model represents a process from a specific perspective.

### **1. Waterfall model**

Waterfall model was the first model proposed. It is also known as **linear sequential model**. In this the first phase must be completed then we can execute the next phase. No overlapping in phases is allowed in the waterfall model. It is the first model in the **software development life cycle**.

Phases of waterfall are:-

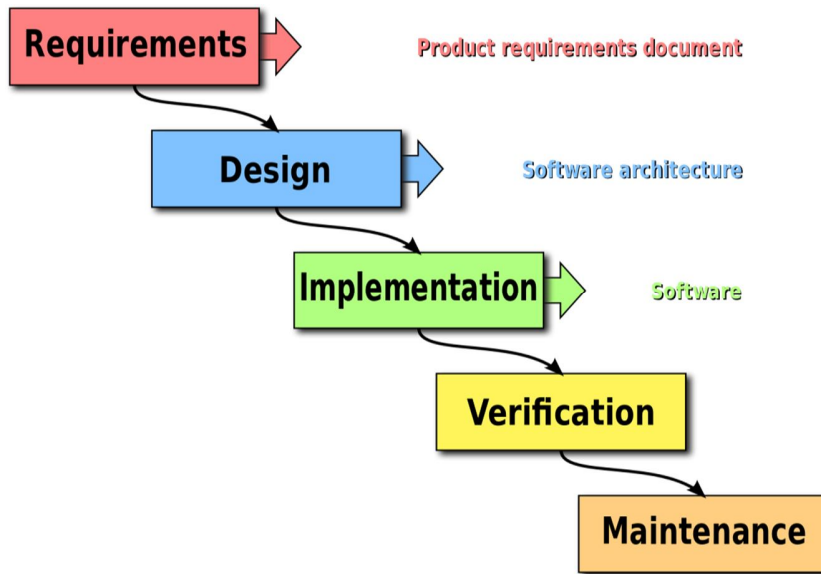
- 1) Requirement Analysis
- 2) System Design
- 3) Implementation
- 4) Verification or Testing
- 5) Deployment and Maintenance

**Advantages:-**

- 1) This model is easy to implement and maintain
- 2) Each phase has specific deliverables and review process.
- 3) It works for small projects.

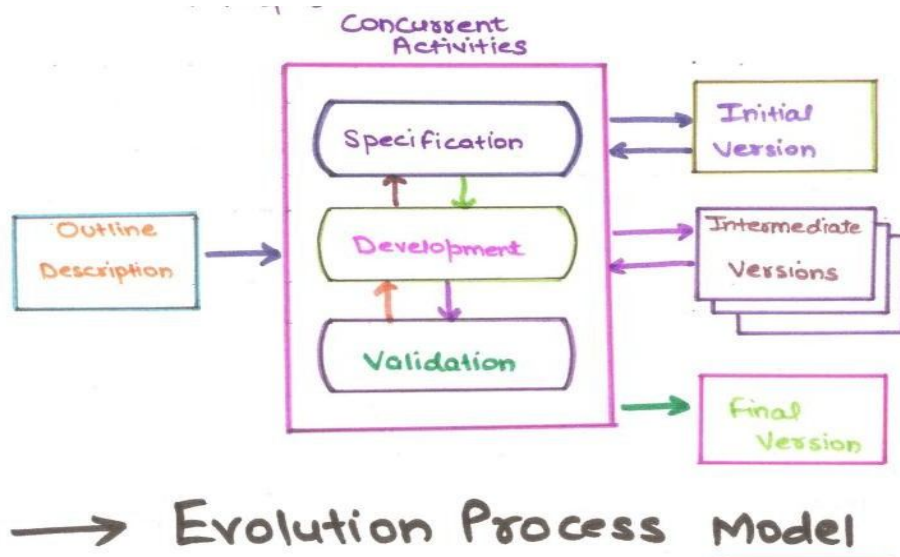
**Disadvantages:-**

- 1) Once process enters testing phase then it cannot be reverted.
  - 2) Poor model for long processes.
  - 3) High amount of risk and uncertainty
-



### 1. Evolutionary model

Evolutionary model is a **combination of iterative and incremental approach** to software development. This is a software development method where the developer or development team first constructs a prototype. After receiving initial feedback from the customer, subsequent prototypes are produced, each with additional functionality or improvement, until the final product emerges.





Advantages of Evolutionary Model:-

**Error reduction**

**User satisfaction**

**Business benefit**

**High quality**

**Low risk**

**Reduction Cost:**

**Disadvantages of Evolutionary Model**

**Several version releases**

**Dividing software:**

**Uncertain nature of customer needs**

**Time and Cost:**

**Confusion by several versions**

## **2. Component based model**

**Component-based process model** is a description or template that uses development of a project by identifying and **reusing components that already exist**.

An individual **software component** is a software package or a module that encapsulates a **set of related functions** (or data).

### **Advantages**

Fully documented, thoroughly tested, Robust, Reusability

## **3. Incremental build model**

The incremental build model is a method of software development where the product is **designed, implemented and tested** incrementally (a little more is added each time) until the product is finished.

---

### Advantages

1. After each iteration, regression testing should be conducted.
2. Customer can respond to features and review the product for any needed or useful changes.
3. Initial product delivery is faster and costless.

### Disadvantages

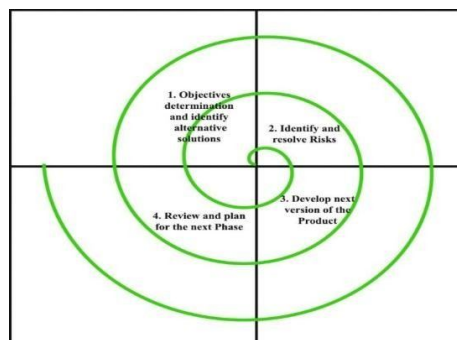
1. As additional functionality is added to the product, problems may arise related to system architecture which were not evident in earlier prototypes

## 5. Spiral model

Spiral model provides **support for Risk Handling**; it looks like a spiral with many loops. **Each loop of the spiral is called a Phase** of the software development process.

**Each phase of Spiral Model is divided into four quadrants** as shown in the above figure. The functions of these four quadrants are discussed below-

1. **Objectives determination and identify alternative solutions:**
2. **Identify and resolve Risks:**
3. **Develop next version of the Product**
4. **Review and plan for the nextPhase:**



The advantages of the Spiral SDLC Model are as follows –

- Changing requirements can be accommodated.
- Allows extensive use of prototypes.
- Requirements can be captured more accurately.
- Users see the system early.
- Development can be divided into smaller parts and the risky parts can be developed earlier which **helps in better risk management**.

The disadvantages of the Spiral SDLC Model are as follows –

- Management is more complex.
- End of the project may not be known early.

### **Check Point:-**

Q.1 What are the stages of the SDLC?

- a. Requirements gathering, design, coding, testing, deployment and maintenance
- b. Design, resource allocation and coding
- c. Testing, maintenance, coding, deployment, and budgeting
- d. Requirements gathering, development, deployment and testing

Q.2 Why is a software life cycle important?

- a. to ensure a quality product
- b. to speed up the time required to complete the project
- c. to improve the programming efficiency
- d. all the above

Q.3 How are prototypes used in the Spiral Model?

- a. to remove the formal structure of the process
  - b. to maintain the integrity of the deadline
  - c. to ensure that feedback is productive
-

d. to break up the project into smaller pieces Give name of different phases of Water fall model. (to be deleted)

Q.4 Which model allows for the project to be constantly refined and improved?

- a. Water fall Model
- b. Spiral Model
- c. Extreme Programming Model
- d. all the above

Q.5 Which model(s) consist(s) of 5 distinct phases which must only go from beginning to end?

- a. Water fall Model
- b. Spiral Model
- c. Extreme Programming Model
- d. all the above

Q.6 Who originally proposed the Spiral Model?

- a. Department of Defence
- b. Barry Boehm
- c. [www.extreme-programming.org](http://www.extreme-programming.org)
- d. no one knows for sure How is clear() function different from del() statement? (to be deleted)

Q.7 What is the software development life cycle?

- a. A process to define the budget of a project
- b. A methodology that defines the steps of a software development project
- c. Resource allocations for each project
- d. The process of defining requirements

Q.8 What is Requirement gathering?

- a. The process of gathering specifications from the client to determine requirements for the project.
  - b. The process of designing the code
  - c. The process of implementing the code
  - d. The process of designing the software
-

Q.9 The alpha test is conducted at the \_\_\_\_\_ site by a representative group of endusers.

Q.10 Black box testing also called \_\_\_\_\_ testing.(glass box, behavioral)

Answer Key:-

**1.A 2. A 3.D 4.B 5.A 6.B 7.B 8. A 9.developer's site 10. Behavioral**

Q.1 What is the need of software engineering?.

Ans:- (i) The software conforms to the specification and is error free.

(ii) The Software is delivered intime.

(iii) The Software is scalable and adaptable.

(iv) The Software costs remain with in budget.

Q. 2 What is feasibility study ?.

Ans:- The feasibility study finds out how practical and beneficial the software project development will prove to the organization. The feasibility study is carried out to know the economic, technical and operational feasibility of the project.

Q. 3 Write the main drawback of spiral model ?.

Ans:- The main drawback is :-

(i) It is based on customer communication. If the communication is not proper then the software product that gets developed will not be up to themark.

(ii) It demands considerable risk assessment. If the risk assessment isdone properly then only the successful product can be obtained.

Q.4 What is the meaning of Verification and Validation ?.

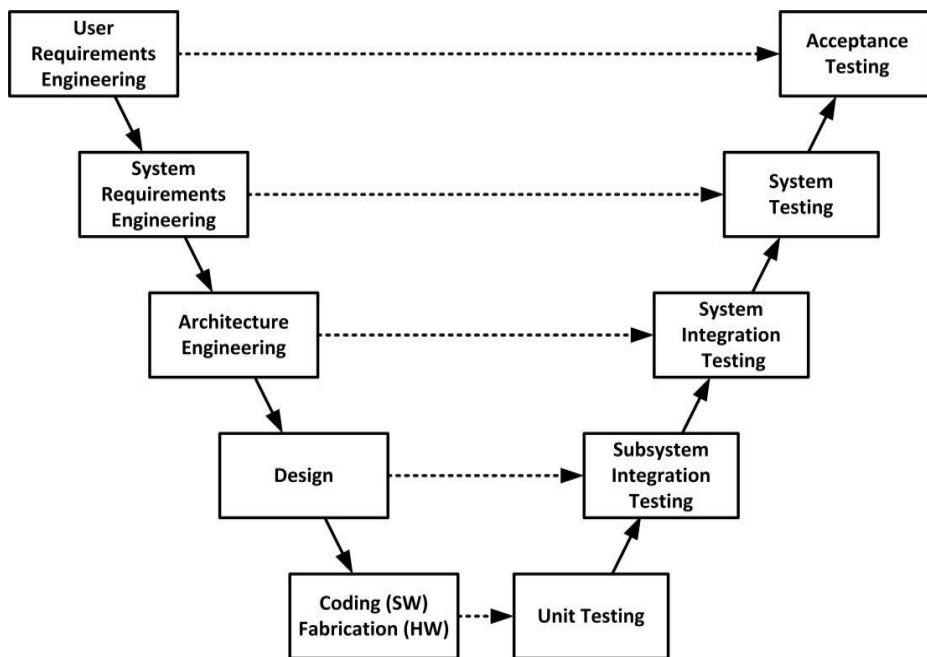
Ans:- Verification means that set of activities that are carried out to confirm that the software correctly implements the specific functionality.

---

Validation means the set of activities that ensure that the software which has been built is satisfying the customer's requirement.

Q. 5 What is V-model ?.

Ans:- The V-Model is a variation of waterfall model, in which instead of moving down in a linear way, the process steps are bent upwards after implementation phase, to form the typical V-shape.



## **AGILE SOFTWARE DEVELOPMENT**

*Agile --readiness for motion, nimbleness, activity, dexterity in motion*

*Meaning – The dictionary meaning of word ' agile ' is quick and well-coordinated movement , so is the performance of the agile software process models.*

*Agility :The ability to both create and respond to change in order to profit in a turbulent business environment.*

It refers to the software process models that are people focused, communication oriented, flexible, speedy, rapid and iterative development of the product in small release. Agile software development is a conceptual framework for software engineering that promotes development iterations throughout the life-cycle of the project. Software developed during one unit of time is referred to as an iteration, which may last from one to four weeks. Agile methods also emphasize working software as the primary measure of progress

### **Characteristics of Agile Software Development –**

Light Weighted methodology

Small to medium sized teams

vague and/or changing requirements

vague and/or changing techniques

Simple design

Minimal system into production

### **Pair Programming:-**

Pair programming is an agile practice. It is a practice of software development wherein two programmers work in pairs to develop the software while sitting at the same work stations. One programmer thinks and other codes, both swapping their roles.

The keyboard owner is called the driver and is responsible for coding where the other partner is called navigator who keeps track of larger issues.

---

## **ADVANTAGES**

Collective code ownership

- BetterCode
- Increased discipline
- Resilient Flow
- Improved morale
- Mentoring
- Team Cohesion

## **DISADVANTAGES**

- Difficult skill sets may kill the project
- Disagreement may occur
- Scheduling conflict between partners
- Absence of Partners
- Rushing

## **SCRUM**

It is an Agile S/w development method for project management that organizes software developers as a team to reach a common goal of creating a ready for market product.

Characteristics:

- Prioritized work is done.
- Completion of backlog items
- Progress is explained
- Agile SoftwareDevelopment

### **Scrum – framework**

Sprint planning – “definition of Done ”

Sprint review – “the demo ”

Sprint retrospective

Daily scrum meeting

### **Cross functional team:-**

A cross-functional team is a group of people with different functional expertise working towards a common goal. It may include people from finance, marketing, operations, and human resources departments

---



**Team:-**

- Seven (plus/minus two) members
- Is cross-functional (Skills in testing, coding, architecture etc.)
- Selects the Sprint goal and specifies work results
- Has the right to do everything within the boundaries of the project guidelines to reach the Sprint goal
- Organizes itself and its work
- Demos work results to the Product Owner.

**Scrum Master:-**

- Ensure that the team is fully functional and productive
- Enables close cooperation across all roles and functions
- Removes barriers
- Shields the team from external interferences during the Sprint
- Ensure that the process is followed, including issuing invitations to Daily Scrum, Sprint Review and Sprint Planning meetings.

**Product Owner:-**

- Define the features of the product.
  - Decide on release date and content.
  - Be responsible for the profitability of the product (ROI).
  - Prioritize features according to market value.
  - Adjust features and priority every iteration as needed
  - Accept or reject work results.

**USE-CASE DIAGRAMS:-**

The Use-Case diagrams are a formal way of representing how a business system interacts with its environment by illustrating the activities that are performed by the users of the system.

There are two categories of Use-Case:-

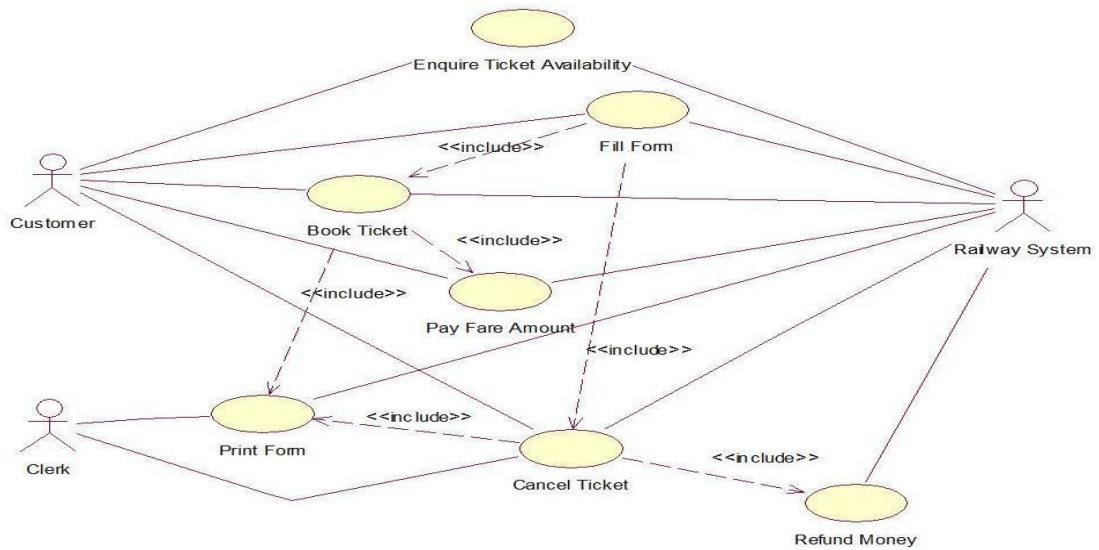
- (i) Business Use-Cases
- (ii) System Use-Cases

Purpose of Use Case Diagram

- Specify the context of a system
  - Capture the requirements of a system
-

- Validate a systems architecture
- Drive implementation and generate test cases
- Developed by analysts together with domain experts

## Railway Reservation System



### Check Point:-

Q.1 What is Version Control Systems? What are the types of version control systems?.

Ans:- Version control systems are a specific, specialized set of software tools that help a software team manage changes to source code overtime.

There are two types of version control systems:-

- (i) Centralized Version Control System.
- (ii) Distributed Version Control System.

Q. 2 In the context of Use-case diagrams, define the following:-

- |                          |                          |                     |                   |
|--------------------------|--------------------------|---------------------|-------------------|
| (i) Actor                | (ii) Use-Case            | (iii) Communication | (iv) Relationship |
| (v) Include relationship | (vi) extend relationship | (vii) System        |                   |

Ans:-

- (i) Actor:- It is a person or a thing, which is outside the system and are involved in

a task. For example in a banking system, account holders are not part of the system but they are involved in banking tasks such as deposit, withdraw and so forth.

(ii) Use-Case:-It represents a task of the system with which actors interact.

(iii) Communication:- It is the linking line joining an actor and its task.

(iv) Relationship/Stereo types:- Two Use-cases have own relationship without involving any external actor.

(v) include relationship:- When a use-case must use another use-case, then such a relationship is shown as <<include>> relationship , eg. A patient getting admitted in a hospital must be registered first. So the use-case patient admission includes the use case patient registration.

(vi) extend relationship:- When a use-case may call another use-case then this is extend relationship. For example, in word processor, the check spelling use case maycall the use-case Add word to custom dictionary.

(vii) System:- It depicts the system in totality i.e. what all use-case together make a system.

Q.3 What is sprints?

Ans:- Scrum relies on an agile software development concept called sprints. The sprints are periods of time when software development is actually done.

Q.4 What is the difference between use case diagram and usecase?

Ans:- Use case diagram shows business or system, its external users, and use cases applicable to the system. Use case represents one specific goal or need of the user from the system.

Q. 5 What is Git.?

Ans:- Git is a distributed version-control system for tracking changes in source code during software development. It is designed for coordinating work among programmers, but it can be used to track changes in any set of files. Its goals include speed, data integrity, and support for distributed, non-linear work flows.

Q. 6 Write the Version Control System Terminology?.

Ans:- 1. Work Copy or Working Copy or Checkout 2. Repository  
3.Version 4.Database History  
5.Commit/Update 6. Push/PullRequests.

---

## UNIT: - 3

### Django BASED WEB APPLICATION

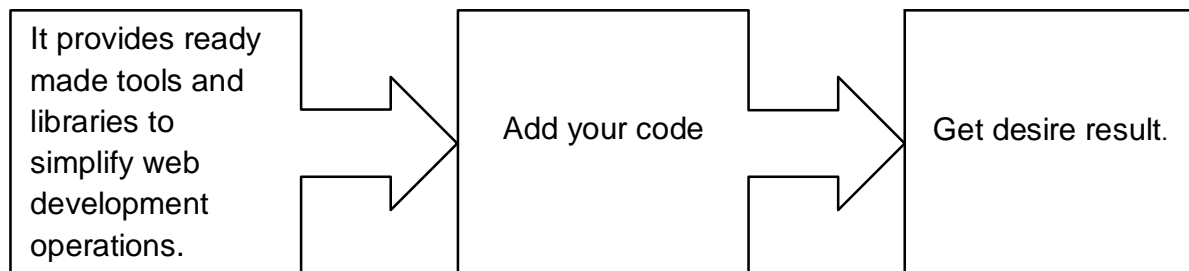
What is Django?

Django is pronounced as *jang-oh*. It is a free and open **source web application framework**, written in Python. Django is robust enough to be used by the largest websites in the world – Instagram, Pinterest, etc. Django allows us to build deep, dynamic, interesting sites in a short time.

- Django is an Open Source Web Framework.
- Django web framework is written in Python language.
- It follows MVC-MVT (Model-View-Template/ Model-View-Controller) architecture.

#### What is a Framework?

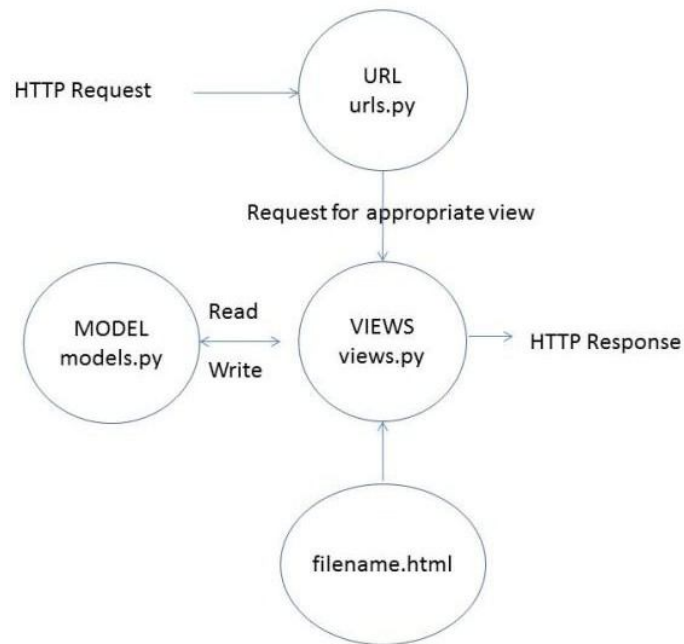
A web framework is a set of components that helps you to develop websites faster and easier. It is used to create dynamic website.



#### Advantages

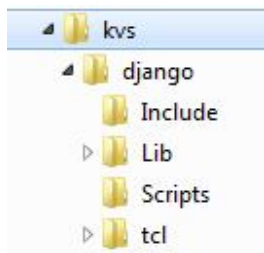
- Written in Python itself.
  - Easy and fast web application development.
  - Object Relational Mapping (ORM) supports.
  - Compatible with major operating systems and databases.
  - Provides robust security features
  - Less coding required to implement an application
  - Easy to extend and scale.
-

## How Django works?

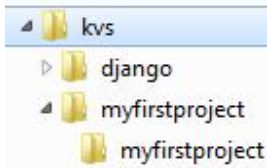


## Practical Implementation of Django

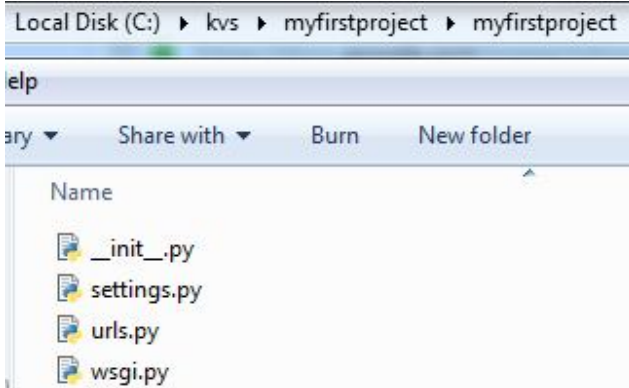
- 1 Installation Python, ignore if you have already installed.
- 2 Open "Command Prompt"
- 3 `C:\> python -m pip install -U pip`
- 4 `C:\> pip install virtualenv`
- 5 Create a directory for a project  
`C:\> md kvs`  
`C:\> cd kvs`
- 6 Create virtual environment  
`C:\kvs> virtualenv django`



- 7 Install django  
`C:\kvs> pip install django`
- 8 Create your django project 'myfirstproject'  
`C:\kvs> django-admin startproject myfirstproject`



The following directory structure must have been created



9 Run the server locally

```
C:\kvs>cd myfirstproject
```

```
C:\kvs\myfirstproject>python manage.py runserver
```

```
C:\kvs>cd myfirstproject

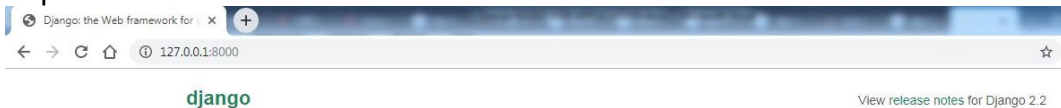
C:\kvs\myfirstproject>python manage.py runserver
Watching for file changes with StatReloader
Performing system checks...

System check identified no issues (0 silenced).

You have 17 unapplied migration(s). Your project may not work properly until
you apply the migrations for app(s): admin, auth, contenttypes, sessions.
Run 'python manage.py migrate' to apply them.
July 25, 2019 - 13:09:51
Django version 2.2.3, using settings 'myfirstproject.settings'
Starting development server at http://127.0.0.1:8000/
Quit the server with CTRL-BREAK.
```

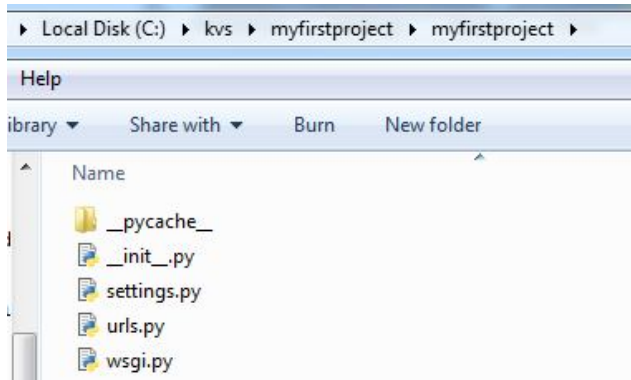
10 Open web browser and type following url:

```
http://127.0.0.1:8000/
```



The install worked successfully! Congratulations!

You are seeing this page because `DEBUG=True` is in your settings file and you have not configured any URLs.

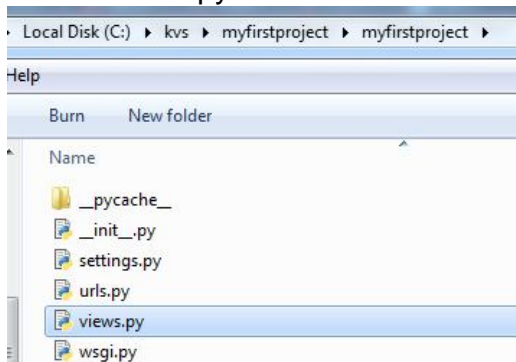


- 11 Open (in Notepad) **urls.py** and update it with following code

```
urls.py - Notepad
File Edit Format View Help
from django.conf.urls import url
from . import views

urlpatterns = [
    url(r'^$', views.home, name="home"),
    url(r'^kvs', views.kvs, name="kvs"),]
```

- 12 Create views.py



- 13 Open (in Notepad) views.py

```
views.py - Notepad
File Edit Format View Help
from django.http import HttpResponse

def home(request):
    return HttpResponse("welcome to first Django Project")

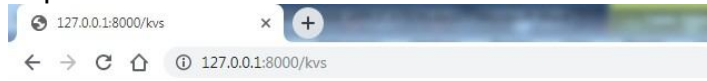
def kvs(request):
    return HttpResponse("<h1>welcome to Kendriya Vidyalaya Sangathan</h1>")
```

- 14 Open browser and type following url  
<http://127.0.0.1:8000/>



- 15 Open browser and type following url

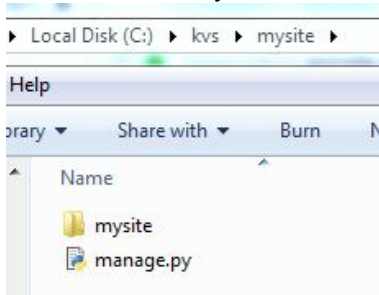
http://127.0.0.1:8000/kvs



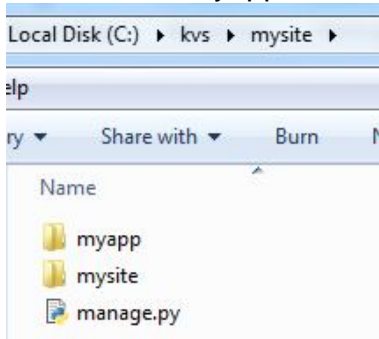
## Welcome to Kendriya Vidyalaya Sangathan

### Implementation of 'GET' method

- 1 Create a folder 'kvs' on computer
- 2 Open 'Command Prompt' (Run as Administrator)
- 3 Type following command:  
cd \kvs
- 4 Django-admin startproject mysite  
It will create 'mysite' folder in 'kvs' folder



- 5 C:\kvs>cd mysite
- 6 C:\kvs\mysite>python manage.py startapp myapp  
It will create 'myapp' folder in 'c:\kvs\mysite' folder



- 7 Open 'mysite' folder and edit 'settings.py' with following code  

```
INSTALLED_APPS = [  
    'myapp.apps.MyappConfig',  
    'django.contrib.admin',  
    'django.contrib.auth',  
    'django.contrib.contenttypes',  
    'django.contrib.sessions',  
    'django.contrib.messages',  
    'django.contrib.staticfiles',  
]
```
- 8 Open 'myapp' folder in 'mysite' folder
- 9 Now, edit 'views.py' file with following code  
from django.shortcuts import render



```

# Create your views here.

from django.http import HttpResponseRedirect

def homepage(request):
    return render(request, 'myapp/firstpage.html')

def result(request):

    if len(request.GET['name'])>0:
        name = request.GET['name']
        sub1 = request.GET['sub1']
        sub2 = request.GET['sub2']
        total = int(sub1) + int(sub2)
        s = name + ' and the sum is ' + str(total)

    else:
        s = "Please fill form"
    return HttpResponseRedirect(s)
10 Create 'templates' folder in 'C:\kvs\mysite\myapp' folder
11 Open 'templates' folder
12 Create 'myapp' folder in templates folder and open it
13 Create 'firstpage.html' with following code
<html>
<head>
<title>Welcome to my first page</title>
</head>
<body>
<h1>Hi, this is my first page</h1>
<hr>

<form method="get" action="/result/">
Enter yourname:
<input type="text" name="name"><br>
Entermarks</br>
Python Language:
<input type="text" name="sub1"><br><br>
MySQL:
<input type="text" name="sub2"><br><br>
<hr>
<button name="result" value="result">Submit Data </button>
</form>
</body>
</html>
14 Come to 'C:\kvs\mysite\myapp' folder
15 Create 'urls.py'. in 'C:\kvs\mysite\myapp' folder
16 Come to 'C:\kvs\mysite\mysite' folder

```

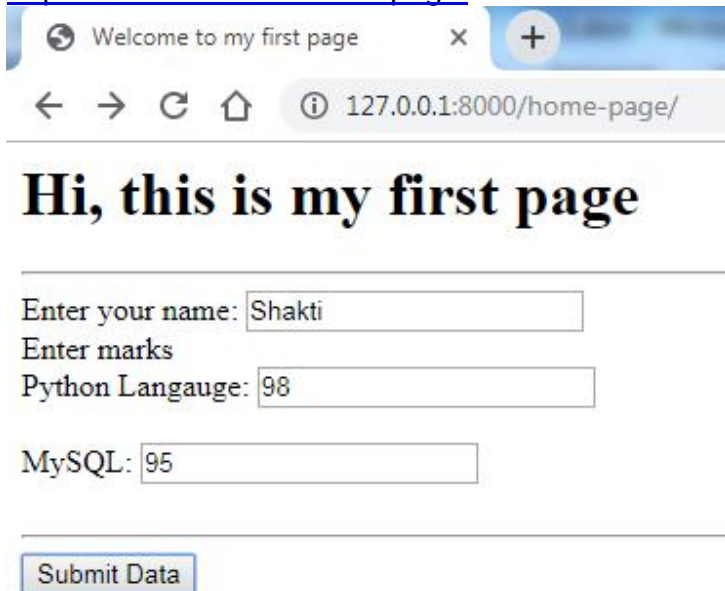
---

- 17 Edit 'urls.py' with following code  

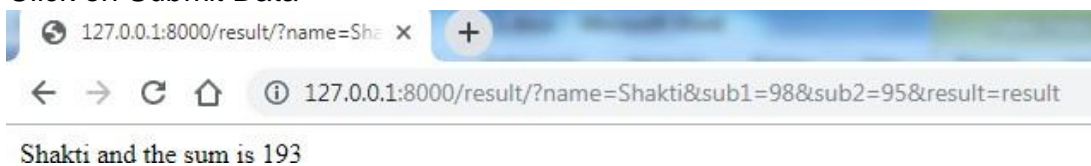
```
from django.conf.urls import url
from myapp import views

urlpatterns = [
    #path('admin/',admin.site.urls),
    url(r'^$',views.homepage),
    url(r'^home-page/$', views.homepage),
    url(r'result/$',views.result),
]

```
- 18 Create 'views.py' in 'C:\kvs\mysite\mysite' folder
- 19 Type following command in 'Command Prompt'  
C:\kvs\mysite>python manage.py runserver
- 20 Open web browser and type following url  
<http://127.0.0.1:8000/>  
or  
<http://127.0.0.1:8000/home-page/>



- 21 Click on Submit Data



## Implementation of 'POST' method

- 1 Create a folder 'kvs' on computer, ignore if already created
- 2 Open 'Command Prompt' (Run as Administrator)
- 3 Type following command:  
cd \kvs

- 4 Django-admin startproject mysite1  
It will create 'mysite1' folder in 'kvs' folder
- 5 C:\kvs>cd mysite
- 6 C:\kvs\mysite1>python manage.py startapp myapp  
It will create 'myapp' folder in 'mysite1' folder
- 7 Open 'mysite1' folder and edit 'settings.py' with following code  
INSTALLED\_APPS = [  
    **'myapp.apps.MyappConfig'**,  
    'django.contrib.admin',  
    'django.contrib.auth',  
    'django.contrib.contenttypes',  
    'django.contrib.sessions',  
    'django.contrib.messages',  
    'django.contrib.staticfiles',  
]
- 8 Open 'myapp' folder in 'c:\kvs\mysite1' folder
- 9 Now, edit 'views.py' file with following code  
from django.shortcuts import render

```
# Create your views here.  
from django.template import engines  
from django.views.decorators.csrf import csrf_exempt  
from django.http import HttpResponse
```

```
def homepage(request):  
    return render(request, 'myapp/firstpage.html')
```

```
@csrf_exempt
```

```
def result(request):  
    if request.method=='POST':  
        nm = request.POST.get("name")  
        sub1 = request.POST.get("sub1")  
        sub2 = request.POST.get("sub2")  
        total = int(sub1) + int(sub2)  
  
        about_template = ""  
        <html>  
        <head>  
        <title>My Calc</title>  
        </head>  
        <body>  
        name ""+ str(nm)+" and the sum is "" + str(total) + ""  
        </body>""  
  
        django_engine = engines['django']  
        template = django_engine.from_string(about_template)  
        html = template.render()  
        return HttpResponse(html)
```

---

```

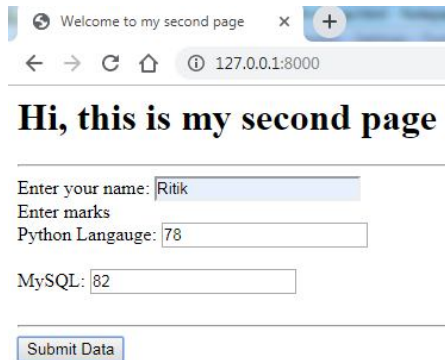
else:
    template = loader.get_template('index.html')
    return HttpResponse(template.render())
10 Create 'templates' folder in 'C:\kvs\mysite1\myapp' folder
11 Open 'templates' folder
12 Create 'myapp' folder in templates folder and open it
13 Create 'firstpage.html' with following code
<html>
<head>
<title>Welcome to my first page</title>
</head>
<body>
<h1>Hi, this is my first page</h1>
<hr>

<form method="post" action="/result/">
Enter yourname:
<input type="text" name="name"><br>
Entermarks</br>
Python Languauge:
<input type="text" name="sub1"><br><br>
MySQL:
<input type="text" name="sub2"><br><br>
<hr>
<button name="result" value="result">Submit Data </button>
</form>
</body>
</html>
14 Come to 'C:\kvs\mysite1\myapp' folder
15 Create 'urls.py'. in 'C:\kvs\mysite1\myapp' folder
16 Come to 'C:\kvs\mysite1\mysite' folder
17 Edit 'urls.py' with following code
from django.conf.urls import url
from myapp import views

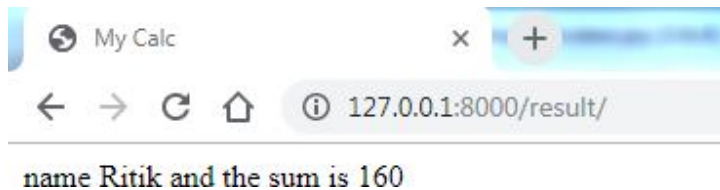
urlpatterns = [
    #path('admin/', admin.site.urls),
    url(r'^$', views.homepage),
    url(r'^home-page/$', views.homepage),
    url(r'result/$', views.result),
]
18 Create 'views.py' in 'C:\kvs\mysite1\mysite' folder
19 Type following command in 'Command Prompt'
C:\kvs\mysite1>python manage.py runserver
20 Open web browser and type following url
http://127.0.0.1:8000/
or
http://127.0.0.1:8000/home-page/

```

---



21 Click on Submit Data



### Differences between GET and POST method

GET	POST
In case of Get request, only <b>limited amount of data</b> can be sent because data is sent in header.	In case of post request, <b>large amount of data</b> can be sent because data is sent in body.
<b>Not secured</b> because data is exposed in URL bar.	<b>Secured</b> because data is not exposed in URL bar.
<b>Can be bookmarked.</b>	<b>Cannot be bookmarked.</b>
<b>Request remains in the browser history</b>	<b>Does not remain in browser history</b>

### Working with Flat file

Here Flat file means a simple text file, which can be viewed in any editor (like Notepad). It has no decorative functions like Bold, Italic, Bullets, Tables etc. Each line of the text file holds one record, with fields separated by delimiters such as comma or tabs (commas are used in the following code).

In following code your data (Name and marks of two subjects) will store in 'C:\kvs\mysite1\mydata.txt'. Open this file in Notepad, you can see the entered data (entered in the form) saved in 'mydata.txt' file.

- 1 Edit 'c:\kvs\mysite1\myapp\views.py' with following code:  

```
from django.shortcuts import render

# Create your views here.
```

```

from django.template import engines
from django.views.decorators.csrf import csrf_exempt
from django.http import HttpResponse
from django.core.files import File

def homepage(request):
    return render(request, 'myapp/firstpage.html')

@csrf_exempt
def result(request):
    if request.method=='POST':
        nm = request.POST.get("name")
        sub1 = request.POST.get("sub1")
        sub2 = request.POST.get("sub2")
        total = int(sub1) + int(sub2)
        #write tofile
        F = open("mydata.txt",mode='a+')
        myfile = File(F)
        rec = nm + ", "+str(sub1) + ", "+str(sub2)+", "+str(total)+"\n"
        myfile.write(rec)
        about_template = ""
        <html>
        <head>
        <title>My Calc</title>
        </head>
        <body>
        name ""+ str(nm)+" and the sum is "" + str(total) + ""
        </body>""

        django_engine = engines['django']
        template = django_engine.from_string(about_template)
        html = template.render()
        return HttpResponse(html)
    else:
        template = loader.get_template('index.html')
        return HttpResponse(template.render())

```

---



## Working with CSV file

A Comma Separated Values (CSV) file is a plain text file and values are separated by comma (,).

- 1 Edit 'c:\kvs\mysite1\myapp\views.py' with following code:

```
from django.shortcuts import render

# Create your views here.
from django.template import engines
from django.views.decorators.csrf import csrf_exempt
from django.http import HttpResponse
import csv

def homepage(request):
    return render(request, 'myapp/firstpage.html')

@csrf_exempt
def result(request):
    if request.method=='POST':
        nm = request.POST.get("name")
        sub1 = request.POST.get("sub1")
        sub2 = request.POST.get("sub2")
```

```

total = int(sub1) + int(sub2)
#write to csv file
response=HttpResponse(content_type='text/csv')
response['Content-Disposition']='attachment;filename="my_csv_file.csv"'
writer = csv.writer(response)
writer.writerow([nm, sub1, sub2, total])
return response
else:
    template = loader.get_template('index.html')
    return HttpResponse(template.render())

```

1. What is Django?
2. What is a Framework?
3. What is MVC-MVT architecture?
4. Which file is edited to install the app?
5. What is the significance of ^ and \$ sign in regular expressions?
6. Suppose a function 'def xyz(request)' is defined in 'views.py'. What code will be written to invoke said function in urls.py.?
7. What command is used to start a project?
8. What command is used to start an app?
9. What command is used to start a server?
10. Why do we require virtual environment?
11. Explain with the help of diagram how Django works.
12. What is the difference between GET and POST methods?
13. Develop a web application that calculates SimpleInterest?
14. Develop a web application that asks name of student, marks and calculates grade in store in a text file "data.txt"?

## Interface Python with SQL database

### What is Database Connectivity?



Front – End: *It is responsible for collecting input in various forms from the user and processing it to confirm to a specification the back end can use.*

---



Back – End: *The systems running a database or any system that holds application data.*  
Some Back-end tools: MySQL, Oracle, Ms-Access etc.

## Implementation Python and MySQL connectivity

### (A) Install mysql connector

- 1 Open 'Command Prompt' (Run as administrator)
- 2 Type following command:  
pip install mysql-connector-python

### (B) Steps for creating database connectivity application

- 1 import mysql.connector  
or  
import mysql.connector as SqlCntr
- 2 Establish connection: (*Connection means a unique session with a database connected from within a program*)  
It requires for things:  
hostname="localhost" server address  
user="root" user as per your MySQL  
passwd ="1234" password as perMySQL  
database="test" database created inMySQL  
Myconn = mysql.connector.connect(hostname="localhost",  
user="root",  
passwd="1234"  
database="test")
- 3 Creating Cursor Object: (*Cursor is responsible for submitting various SQL statements to a database server.*)  
Mycursor = Myconn.cursor()
- 4 Execute SQL query:  
Mycursor.execute( "your sql query" )
- 5 Mycursor.close()
- 6 Myconn.close()

## Practical Implementation

We have created 'student' table in "test" database in MySQL.

Field Name	Data Type	Constraints	Remark
Rollno	Int	Primary Key	
Name	Varchar(20)		
DOB	Date		
Python	Int		Marks of python
Mysql	Int		Marks of mysql

## **Insert a record**

```
import mysql.connector as connector

conn = connector.connect(host="localhost", database="test",
user="root",passwd="1234")

if conn.is_connected():
    #prepare sql query
    rln = input("Enter roll number: ")
    nm = input("Enter your name: ")
    hbd = input('Enter date of birth(yyyy-mm-dd): ')
    python = input('Enter marks of Python: ')
    mysql = input('Enter marks of MySQL: ')
    sql_query = "insert into student values({} , '{}', '{}', {},
    {})".format(rln,nm,hbd,python,mysql)

    #execute sql query
    cur = conn.cursor()
    cur.execute(sql_query)
    conn.commit()
    cur.close()
    conn.close()
else:
    print("Something is wrong in connection")
```

## **output**

```
Enter roll number: 101
Enter your name: Geet
Enter date of birth(yyyy-mm-dd): 2004-06-25
Enter marks of Python: 88
Enter marks of MySQL: 96
```

## **Display records**

```
import mysql.connector as connector

conn = connector.connect(host="localhost", database="test", user="root",passwd="1234")

if conn.is_connected():
    #prepare sql query
```

---

```
sql_query = "select rollno, name, dob, python, mysql, python+mysql from student"
```

```
#execute sql query  
cur = conn.cursor()  
cur.execute(sql_query)  
result = cur.fetchall()  
for row in result:  
    for val in row:  
        print(val, end="\t")  
    print()
```

```
cur.close()  
conn.close()
```

```
else:  
    print("Something is wrong in connection")
```

### **Output**

101	Geet	2004-06-25	88	96	184
102	Shakti	2005-12-26	54	56	110
119	Diya	2006-07-21	89	99	188

### **Delete a record**

```
import mysql.connector as connector
```

```
conn = connector.connect(host="localhost", database="test", user="root", passwd="1234")
```

```
if conn.is_connected():  
    #prepare sql query  
    rln = input("Enter roll number to be removed: ")  
    sql_query = "select * from student where rollno={}".format(rln)
```

```
#execute sql query  
cur = conn.cursor()  
cur.execute(sql_query)  
result = cur.fetchall()
```

```
if cur.rowcount>=1:
```

```
    print("-----ExistingRecord ----- ")  
    for row in result:  
        for val in row:
```

---

```

        print(val, end="\t")
    print()
    ans = input("Are you sure(y/n): ")
    if ans=='y':
        sql_query = "delete from student where rollno={}".format(rln)
        cur.execute(sql_query)
        conn.commit()
        print("Record successfully deleted")
    else:
        print("Delete operation cancelled")
    else:
        print("\n\n\tSorry, record not found...!!!")
    cur.close()
    conn.close()
else:
    print("Something is wrong in connection")

```

### output

```

Enter roll number to be removed: 101
-----Existing Record-----
101  Geet 2004-06-25  88  96
Are you sure(y/n): y
Record successfully deleted

```

### Update a record

```

import mysql.connector as connector

conn = connector.connect(host="localhost", database="test", user="root",passwd="1234")

if conn.is_connected():
    #prepare sql query
    rln = input("Enter roll number to be updated: ")
    sql_query = "select * from student where rollno={}".format(rln)

    #execute sql query
    cur = conn.cursor()
    cur.execute(sql_query)
    result = cur.fetchall()

    if cur.rowcount>=1:
        print("-----ExistingRecord ----- ")

```

---

```

for row in result:
    for val in row:
        print(val, end="\t")
    print()
print("-----ProvideNewRecord ----- ")
roln = input("Enter roll number: ")
nm = input("Enter your name: ")
hbd = input('Enter date of birth(yyyy-mm-dd):')
python = input('Enter marks of Python: ')
mysql = input('Enter marks of MySQL:')

#prepare sql query for update
sql_query = "update student set rollno={}, name='{}', dob='{}', python={},
mysql={}".format(roln, nm, hbd, python,mysql)
cur.execute(sql_query)
conn.commit()
else:
    print("\n\n\tSorry, recordnotfound ....!!!")
cur.close()
conn.close()
else:
    print("Something is wrong in connection")

```

### output

```

Enter roll number to be updated: 119
-----Existing Record-----
119  Diya  2006-07-21  89  99
-----Provide New Record-----
Enter roll number: 10119
Enter your name: Drishti
Enter date of birth(yyyy-mm-dd): 2006-08-18
Enter marks of Python: 88
Enter marks of MySQL: 99

```

### Some methods of cursor

fetchone()	This method retrieves the next row of a query result set and returns a single sequence, or None if no more rows are available.
fetchall()	The method fetches all (or all remaining) rows of a query result set and returns a list of tuples. If no more rows are available, it returns an empty list.
fetchmany(num)	This method fetches the next set of rows of a query result and returns a list of tuples. If no more rows are available, it returns an empty list.
rowcount	This read-only property returns the number of rows returned for SELECT statements

1. Develop a program that displays all records of a table. Use fetchone() methods to implement it.
2. Ms.Programmer developed a Python program to insert a record .Program runs very well but record does not reflect in MySQL. What could be the reason?
3. What is the difference between fetchmany() and fetchall()?
4. Explain a connection and its role in database connectivity?
5. What is role of cursor?
6. Identify the correct import statement
  - a. Import mysql-connector
  - b. Import mysql.connection
  - c. Import mysql.connection.python
  - d. Import mysql.connector
7. What will the output of following code

```
a = "sita"
b = "snake"
c = "{} is killed by {}".format(a,b)
print(c)
```
8. Which function is used to run SQLquery?

### **(More onSQL)**

*"You can have data without information, but you cannot have information without data."*  
(Daniel Keys Moran)

---

A database is an organized collection of data. The data are typically organized to model aspects of reality in a way that supports processes requiring this information. The term "database" can both refer to the data themselves or to the database management system. The Database management system is a software application for the interaction between users database itself. Users don't have to be human users .In this chapter we will learn how SQL organizes & manipulate data.

#### **What is SQL?**

- SQL stands for Structured Query Language
  - SQL lets you access and manipulate databases
  - SQL became a standard of the American National Standards Institute (ANSI)in 1986, and of the International Organization for Standardization (ISO) in1987
-

## What Can SQL do?

- SQL can execute queries against a database
- SQL can retrieve data from a database
- SQL can insert records in a database
- SQL can update records in a database
- SQL can delete records from a database
- SQL can create new databases
- SQL can create new tables in a database
- SQL can create stored procedures in a database
- SQL can create views in a database
- SQL can set permissions on tables, procedures, and views

## RDBMS

RDBMS stands for Relational Database Management System.

RDBMS is the basis for SQL, and for all modern database systems such as MS SQL Server, IBM DB2, Oracle, MySQL, and Microsoft Access.

The data in RDBMS is stored in database objects called tables. A table is a collection of related data entries and it consists of columns and rows.

## MYSQL TERMINOLOGY

### Structure Query Language

A non-procedural 4GL used for querying upon relational database

### DDL: Data Definition Language

Part of the SQL that facilitates defining creation/modification etc. of database object such as tables, indexes, sequences etc.

### DML: Data Manipulation Language.

Part of the SQL that facilitates manipulation (additions/deletions/modification) of data which resides in the database tables.

### Meta Data

Facts/data about the data stored in table.

### Data Dictionary

A file containing facts/data about the data stored in table

### Relational Data Model

In this model data is organized into tables i.e. rows and columns. These tables are called relations.

### The Network Data Model

In this model data are represented by collection of records & relationships among data. The collections of records are connected to one another by means of links.

### The Hierarchical Data Model

In this model records are organized as trees rather than arbitrary graphs.

---

## **Object Oriented Data Model**

Data and associated operations are represented by objects. An object is an identifiable entity with some characteristics and behavior.

### **Relation:**

Table in Database

### **Domain:**

Pool of values from which the actual values appear.

### **Tuple:**

A row of a relation

### **Attribute:**

A column of relation

### **Degree:**

Number of attributes

### **Cardinality:**

Number of tuples

### **View:**

Virtual table that does not really exist in its own right.

### **Primary Key:**

Set of one or more attributes that can uniquely identify tuples with in the relation.

### **Candidate Key:**

A Candidate Key is the one that is capable of becoming Primary key i.e., a field or attribute that has unique value for each row in the relation.

### **Alternate Key:**

A candidate key that is not primary key is called alternate key.

### **Foreign Key:**

A non-key attribute, whose values are derived from the primary key of some other table.

## **Integrity Constraints**

Integrity constraints are the rules that a database must comply at all times.

It determines what all changes are permissible to a database.

### **Type Of Constraints**

1. Column Constraint
2. Table Constraint

---

## **Accessing Database in MySql :**

Through USE keyword we can start any database

Syntax:

USE <database Name>;

Example: USE STUDENT;

## **CREATING TABLE IN MYSQL**

Through Create table command we can define any table.

---



```
CREATE TABLE <tablename>
(<columnname><datatype>[(<Size>)],... ..);
CREATE TABLE Student(SRollNo integer, Sname char(20));
```

### **INSERTING DATA INTO TABLE**

The rows are added to relations using INSERT command.

```
INSERT INTO <tablename>[<columnname>]
VALUES (<value>, <value>...);
INSERT INTO student (Sid, Sname)
VALUES (100,'ABC');
```

### **SELECT COMMAND:**

It lets us make queries on the database. SELECT \*  
FROM table name WHERE condition; SELECT \*  
FROM student WHERE Sid=100;

### **Eliminating Redundant Data**

DISTINCT keyword eliminates redundant data  
SELECT DISTINCT Sid FROM Student;

### **Selecting from all the rows-ALL Keyword**

```
SELECT ALL Sid FROM Student;
```

### **Viewing structure of table:**

```
DESCRIBE/DESC <tablename>;
DESCRIBE student;
Using column aliases:
SELECT <column name> AS [columnalias][,...]
FROM <tablename>;
SELECT rollno, name AS "studentname"
FROM student;
```

### **Condition based on a range:**

Keyword BETWEEN used for making range checks in queries.

```
SELECT rollno, name FROM student WHERE rollno BETWEEN 10 AND 20;
```

### **Condition based on a list:**

Keyword IN used for selecting values from a list of values.

```
SELECT rollno, name FROM student WHERE rollno IN (10, 20, 60);
```

### **Condition based on a pattern matches:**

---

Keyword LIKE used for making character comparison using strings

1. percent(%) matches any substring
2. underscore(\_) matches any character

```
SELECT Rollno, name FROM student WHERE name LIKE '%ri';
```

### **MySQL functions:**

A function is a special type of predefined command set that performs some operation and returns a single value.

1. String functions :(Lower / LCASE( ), Upper/UCASE( ), Concat( ), Instr( ), Length( ), RTrim( ), LTrim( ), Substr( ))
2. Numeric function :(Round( ), Truncate( ), Mod( ), Sign( ))
3. Date functions:(Curdate( ), Date( ), Month( ), year( ), DayName( ), DayofMonth(), DayofWeek( ), DayofYear( ), Now( ), SysDate())

### Aggregate functions

**Aggregate functions** are functions that can **work on rows of a database**. They are used in a similar way to functions in spreadsheets (Microsoft Excel).

These functions will return a value when they are run on a row. They will look at the values in a row and then perform the function on the values.

The most common aggregate functions used are listed below:

Function	Description
AVG ( )	Returns the average value of a numeric column or expression
COUNT ( )	Returns the number of rows that match the criteria in the WHERE clause
MAX ( )	Returns the largest value of the selected column or expression
MIN ( )	Returns the smallest value of the selected column or expression
SUM ( )	Returns the total sum of a numeric column or expression

SQL aggregate functions **require parameter values** in the same way that pre-defined programming functions do. Without a parameter, the aggregate function will give an error.

Take notes of the following points:

- COUNT( ) should **always** return a **positive number or zero**. This is due to the fact that you cannot have a negative COUNT()
-

- You **cannot** use an aggregate function in a WHERE clause.
- We can use **two or more** aggregate expressions in a SELECT statement as shown below:

```
SELECT MIN (meritPoints), MAX (meritPoints)FROM Pupil;
```

### **ORDER BY clause:**

It is used to sort the results of a query.

```
SELECT <column name> [, <column name>, ...]
FROM <table name>
[WHERE <condition>]
[ORDER BY <column name>];
```

```
SELECT *
FROM student
WHERE marks>50
ORDER BY name;
```

### The SQL GROUP BY Statement

The GROUP BY statement group rows that have the same values into summary rows, like "find the number of customers in each country". The GROUP BY statement is often used with aggregate functions (COUNT, MAX, MIN, SUM, AVG) to group the result-set by one or more columns.

### **Creating tables with SQL Constraint :**

CREATE TABLE command is used to CREATE tables  
 CREATE TABLE tablename  
 (columnname datatype size, ...);

### **SQL Constraint:**

A Constraint is a condition or check applicable on a field or set of fields.

### **NOT NULL/UNIQUE/DEFAULT/CHECK/PRIMARY KEY/FOREIGN KEY Constraint:**

```
CREATE TABLE student (Srollno integer NOT NULL, ...);
```

```
CREATE TABLE student (Srollno integer UNIQUE, ...);
```

---

```
CREATE TABLE student (Srollno integer NOT NULL, Sclass integer, Sname varchar(30),  
Sclass DEFAULT 12);
```

```
CREATE TABLE student (Srollno integer CHECK (Srollno>0), Sclass integer, Sname  
varchar(30));
```

```
CREATE TABLE student (Srollno integer NOT NULL PRIMARY KEY, Sclass integer,  
Sname varchar(30));
```

```
CREATE TABLE teacher (Tid integer NOT NULL, FOREIGN KEY (Studentid )  
REFERENCES student (Sid));
```

### **Inserting data into table:**

INSERT INTO command is used to insert data into table

```
INSERT INTO tablename VALUES (value1,...);
```

```
INSERT INTO student VALUES (1,'Ram',12);
```

### **Modifying data in tables:**

Existing data in tables can be changed with UPDATE command.

```
UPDATE student SET Sclass=11 WHERE Sname='Ram';
```

### **Deleting data from tables:**

Tuples in a table can be deleted using DELETE command.

```
DELETE FROM student WHERE Srollno>10;
```

---

## **VERY SHORT ANSWER QUESTIONS(1 Mark)**

1. Which of the following is not a built in aggregate function in SQL?

- a) avg
- b) max
- c) total**
- d) count

Answer:c

Explanation: SQL does not include total as a built in aggregate function. The avg is used to find average, max is used to find the maximum and the count is used to count the number of values.

2. State true or false: SQL does not permit distinct with count(\*)

---

a) True

b) False

Answer:a

Explanation: SQL does not permit distinct with count(\*) but the use of distinct is allowed with max and min.

3. We apply the aggregate function to a group of sets of tuples using the \_\_\_\_\_ clause.

a) group by

b) group

c) group set

d) group attribute

Answer: a

Explanation: We apply the aggregate function to a group of sets of tuples using the group by clause. The groupby clause must always be used when ever we are willing to apply the aggregate function to a group of sets of tuples.

4. Choose the correct option regarding the query

```
SELECT branch_name, COUNT(DISTINCTcustomer_name)
FROM depositor, account
WHERE
depositor.account_number=account.account_number
```

```
GROUPBY branch_id HAVING
```

```
avg(balance)=10000;
```

a) The having clause checks whether the query result is true or not

b) The having clause does not check for any condition

**c) The having clause allows only those tuples that have average balance10000**

d) None of the

mentioned . Answer:c

Explanation: The having clause is used to check for conditions that need to be set on aggregate functions.

5. The\_\_\_\_\_aggregation operation adds up all the values of the attribute

a) add

b) avg

c) max

**d) sum**

Answer: d

Explanation: The sum aggregation operation adds up all the values of the specified attribute. There does not exist any aggregation such as add.

6. State true or false: Any attribute which is present in the having clause without

---

being aggregated must not be present in the group by clause.

a) True

**b) False**

Answer: b

Explanation: Any attribute which is present in the having clause without being aggregated must be present in the group by clause. Otherwise, the query is considered to be erroneous.

7. State true or false: We can rename the resulting attribute after the aggregation function has been applied

a) True

b) False

**Answer: a**

Explanation: Yes, we can rename the resulting attribute after the aggregation function has been applied by using a specific keyword.

8. Which keyword is used to rename the resulting attribute after the application of the aggregation function?

a) rename

**b) as**

c) replace

d) to

Answer:b

Explanation: The “as” keyword is used to rename the resulting attribute after the aggregation function has been applied. Just like any other renaming operation, the as keyword simplifies the name of the relation.

9. What values does the count(\*) function ignore?

a) Repetitive values

**b) Null values**

c) Characters

d) Integers

Answer:b

Explanation: The count(\*) aggregation function ignores null values while calculating the number of values in a particular attribute.

10. What is the meaning of “GROUP BY” clause inMysql?

**a) Group data by column values**

b) Group data by row values

c) Group data by column and row values

d) None of the

mentioned Answer:a

---

11. Which clause is similar to "HAVING" clause in Mysql?

- a) SELECT
- b) WHERE**
- c) FROM
- d) None of the above

Answer:b

Explanation: "WHERE" is also used to filter the row values in Mysql.

12. What is the meaning of "HAVING" clause inMysql?

- a) To filter out the rowvalues**
- b) To filter out the column values
- c) To filter out the row and column values
- d) None of the above

Answer:a

13. "COUNT" keyword belongs to which categories in Mysql?

- a) Aggregate functions**
- b) Operators
- c) Clauses
- d) All of the mentioned

Answer:a

14. Which among the following belongs to an "aggregate function"?

- a) COUNT**
- b) UPPER
- c) LOWER
- d) All of the mentioned

Answer:a

15. Which of the following belongs to an "aggregate function"?

- a) COUNT
- b) SUM/AVG
- c) MIN/MAX
- d) All of the mentioned**

Answer: d

16. Which clause is used with an "aggregate functions"?

- a) GROUP BY**
- b) SELECT
- c) WHERE
- d) Both a and c

Answer:a

---

Explanation: "GROUP BY" is used with aggregate functions.'

17. What is the cardinality of the Cartesian product of table?

Ans. Cardinality is the number of rows and degree is the number of columns in a table.

18. Write two examples of RDBMS software.

Ans. Oracle, MySQL, Microsoft SQL Server etc

19. Which SQL keyword is used to retrieve only unique values?

Ans. DISTINCT keyword is used to select the distinct rows.

20. Differentiate between Candidate Key and Alternate Key in context of RDBMS

Ans. **Candidate Key:** A Candidate Key is the one that is capable of becoming Primary key i.e., a field or attribute that has unique value for each row in the relation.

**Alternate Key:** A Candidate Key that is not a Primary key is called an Alternate Key.

### SHORT ANSWER QUESTIONS (2 Marks)

---

1. What is the purpose and use of SQL?

Ans. It is a special purpose programming language defined for managing data held in a Relational Database Management System(RDBMS)

2. Which commands is(are) used to change a tables' storage characteristics?

Ans. ALTER table command is used to change the structure of the table and we can use it as;

Syntax:

ALTER Table "table name" add "column name datatype

OR

DROP column "column name"

3. Write the output of following MYSQL queries:

(i) SELECT ROUND(6.5675,2);

(ii) SELECT TRUNCATE(5.3456,2);

(iii) SELECT DAYOFMONTH(curdate());

(iv) SELECT MID('PRE\_BOARDCLASS

12',4,6);

Ans. Outputs are :

(i) 6.57

(ii) 5.34 (iii) Day no of curdate (), Ex. If curdate is 05/12/2017 then

output is 5

(iv) \_BOARD

4. Mr. Tiwari created two tables with DEPTNO as Primary key in Table1 and Foreign Key in

Table2. While inserting a row in Table2. Mr. Tiwari is not able to enter a value in the column DEPTNO.

---



What could be the possible reason and solution for it. Also explain the significance of foreign key in a table.

Ans. That value is not existing in the Table1. It is due to referential integrity constraint.

Importance of foreign key in a table: Foreign key column is related to a column which is uniquely identified and

declared primary key in another table with.

Foreign key constraints help in making joining of tables

and to find combined values according to user setting and commands.

5. What are the aggregate functions in SQL?

Ans. Aggregate function is a function where the values of multiple rows are grouped together as input on certain criteria to form a single value of more significant meaning.

6. Name some aggregate functions used in

SQL. Ans. a. Sum( ) b. Avg( ) c. Min()

7. What is Order by clause in SQL?

Ans. The SQL ORDER BY clause is used to sort the data in ascending or

descending order, based on one or more columns. Some databases sort the query results in an ascending order by default.

8. What is Group By clause in SQL?

Ans. The GROUP BY Statement in SQL is used to arrange identical data into groups with the help of some functions. i.e if a particular column has same values in different rows then it will arrange these rows in a group. Important Points: GROUP BY clause is used with the SELECT statement.

9. What are the various types of Commands available in SQL?

Ans. Types of Commands in SQL are:

a. DDL i.e Data Definition Language

b. DML i.e Data Manipulation Language

c. TCL i.e Transaction Control Language

10. What is the 'Data Type'? What are the main objectives of datatypes?

Ans. Data type is defined as a set of values along with the operation that can be performed on those values. Some Common data types are : int, float, varchar, char, string etc

Main Objective of Data Type are:

a. Optimum use of Storage space

b. Represent all possible values

c. Improve data integrity

11. What is the difference between a WHERE clause and a HAVING clause in SQL SELECT statement?

Ans. The WHERE condition are applicable on individual rows whereas HAVING conditions are applicable on groups as formed by GROUP BY clause.

### **LONG ANSWER QUESTIONS(3/4/6 Marks)**

1. Consider the table SHOPPE given below. Write command in MySql for (i) to (vi) and output for (vii) to(viii).

---

**Table : SHOPPE**

Code	Item	Company	Qty	City	Price
102	Biscuit	Britannia	100	Delhi	15.00
103	Jam	Kissan	110	Kolkata	90.00
101	Coffee	Nestle	200	Kolkata	55.00
106	Sauce	Kissan	56	Mumbai	65.00
107	Cake	Britannia	72	Delhi	25.00
104	Maggi	Nestle	150	Mumbai	10.00
105	Chocolate	Cadbury	170	Delhi	35.00

- a. To display names of the items, whose name starts with 'C' in ascending order of Price.
- b. To display Code, Item name and City of the products whose quantity is between 50 to 100.
- c. To count distinct Companies from the table.
- d. To insert a new record in the table SHOPPE. '110', 'Pizza', 'Domino', 120, 'Kolkata', 50.0.

Ans. a. SELECT Item from SHOPPE WHERE Item like "C%" ORDER BY Price;  
b. SELECT Code , Item, City FROM SHOPPE WHERE Qty between 50 and 100;  
c. SELECT Count (distinct Company) FROM SHOPPE;  
d. INSERT INTO SHOPPE VALUES ("110", "Pizza", "Domino", 120, "Kolkata", 50.0);

2. Write MySQL command to create the Table PAYMENT including its constraints.

**Table : PAYMENT**

Name of Column	Type	Size	Constraint
Loan_no	integer		Primary Key
Payment_name	Varchar	20	
Payment_amount	integer		Not Null
Payment_date	Date		

Ans. CREATE TABLE PAYMENT(  
    Loan\_no integer Primary key,  
    Payment\_name Varchar (20),  
    Payment\_amount integer not null,  
    Payment\_date date  
);

3. Consider the following tables item and Customer. Write SQL Commands for the statement (i) to (iv) and give outputs for SQL queries (v) to (viii).

**Table: ITEM**

---

I_ID	ItemName	Manufacture	Price
PC01	Personal Computer	ABC	35000
LC05	Laptop	ABC	55000
PC03	Personal Computer	XYZ	32000
PC06	Personal Computer	COMP	37000
LC03	Laptop	PQR	57000

**Table: CUSTOMER**

C_ID	CustomerName	City	I_ID
01	MRS REKHA	Delhi	LC03
06	MANSH	Mumbai	PC03
12	RAJEEV	Delhi	PC06
15	YAJNESH	Delhi	LC03
16	VIJAY	Banglore	PC01

- (i) To display the details of those customers whose city is Delhi.
- (ii) To display the details of item whose price is in the range of 35000 to 55000 (both values included)
- (iii) To display the customer name, city from table Customer, and item name and price from table Item, with their corresponding matching I\_ID.
- (iv) To increase the price of all items by 1000 in the table Item.
- (v) `SELECT DISTINCT City FROM Customer;`
- (vi) `SELECT ItemName, MAX(Price),Count(*)  
FROM Item GROUP BY ItemName;`
- (vii) `SELECT CustomerName, Manufacturer  
FROM Item, Customer  
WHERE Item.Item_Id=Customer.Item_Id`
- (viii) `SELECT ItemName, Price*100  
FROM Item WHERE Manufacture= 'ABC';`

Answer:

(i) `SELECT * FROM CUSTOMER  
WHERE City ='Delhi';`

(ii) `SELECT * FROM ITEM`

---

WHERE PRICE BETWEEN 35000 TO 55000;

(iii) SELECT CustomerName, City, ItemName, Price  
FROM CUSTOMER, ITEM  
WHERE CUSTOMER.I\_ID = ITEM.I\_ID;

(iv) UPDATE ITEM  
SET Price = Price + 1000 ;

(v) Delhi  
Mumbai  
Bangalore

(vi) Personal computer 37000 3  
Laptop 57000 2

(vii)

MRS REKHA	PQR
MANSH	XYZ
RAJEEV	COMP
YAJNESH	PQR
VIJAY	ABC

(viii) Personal computer 3500000  
Laptop 5500000

4. Consider the following tables Product and Client. Write SQL commands for the statement (i) to (iv) And give outputs for SQL queries (v) to (viii)

**Table: PRODUCT**

P_ID	ProductName	Manufacturer	Price
TP01	Talcum Powder	LAK	40
FW05	Face Wash	ABC	45
BS01	Bath Soap	ABC	55
SH06	Shampoo	XYZ	120
FW12	Face Wash	XYZ	95

**Table: CLIENT**

C_ID	ClientName	City	P_ID
------	------------	------	------

---

01	Cosmetic Shop	Delhi	FW05
06	Total Health	Mumbai	BS01
12	Live Life	Delhi	SH06
15	Pretty Woman	Delhi	FW12
16	Dreams	Banglore	TP01

- (i) To display the details of those Clients whose City is Delhi.
- (ii) To display the details of Products Whose Price is in the range of 50 to100(Both values included).
- (iii) To display the ClientName, City from table Client, and ProductName and Price from table Product, with their corresponding matching P-ID.
- (iv) To increase the Price of all Products by10.
- (v) SELECT DISTINCT City FROM Client"
- (vi) SELECT Manufacturer, MAX(Price), Min(Price),Count(\*)  
FROM Product GROUP BY Manufacturer;
- (vii) SELECT ClientName,ManufacturerName  
FROM Product, Client  
WHERE Client.Prod-ID=Product.P\_ID;
- (viii) SELECT ProductName, Price \*4  
FROMProduct;

Answer:

- (i) SELECT \*  
FROM CLIENT  
WHERE City="Delhi";
  - (ii) SELECT\*  
FROM PRODUCT  
WHERE Price between 50 to 100;
  - (iii) SELECT ClientName, City, ProductName,Price  
FROM CLIENT,PRODUCT  
WHERE CLIENT.P\_ID=Product.P\_ID;
  - (iv) Update PRODUCT  
SETPrice=Price+10
  - (v) Delhi  
Mumbai  
Bangalore
-

(vi) LAK	40	40	1
ABC	55	45	2
XYZ	120	95	2

(vii)CosmeticShop	Face Wash
TotalHealth	BathSoap
LiveLife	Shampoo
PrettyWoman	FaceWash
Dreams	TalcumPowder

(viii) Talcum Powder	160
Face Wash	180
Bath Soap	220
Shampoo	480
Face Wash	380

5. Consider the following tables. Write SQL commands for the statements (i)to(iv) and give outputs for SQL queries (v) to(viii)

**TABLE: SENDER**

SenderID	SenderName	SenderAddress	SenderCity
ND01	R Jain	2, ABC Appts	New Delhi
MU02	H Sinha	12, Newton	Mumbai
MU15	S Jha	27/A, Park Street	Mumbai
ND50	T Prasad	122-K, SDA	New Delhi

**TABLE: RECIPIENT**

RecID	SenderID	RecName	RecAddress	RecCity
KO05	ND01	R Bajpayee	5, Central Avenue	Kolkata
ND08	MU02	S Mahajan	116, A Vihar	New Delhi
MU19	ND01	H Singh	2A, Andheri East	Mumbai
MU32	MU15	P k Swamy	B5, C S Terminus	Mumbai
ND48	ND50	S Tripathi	13, B1 D, Mayur Vihar	New Delhi

- (i) To display the names of all Senders fromMumbai
  - (ii) To display the RecID, SenderName, SenderAddress, RecName, RecAddress for every Recipient
  - (iii) To display Recipient details in ascending order ofRecName
  - (iv) To display number of Recipients from eachcity
  - (v) SELECT DISTINCT SenderCity FROMSender;
-

- (vi) SELECT A.SenderName,B.RecName  
FROM Sender A, Recipientb  
WHERE A.SenderID=B.SenderID AND B.RecCity= 'Mumbai';
- (vii) SELECT RecName, RecAddress  
FROM Recipient  
WHERE RecCity NOT IN ('Mumbai', 'Kolkata');
- (viii) SELECT RecID, RecName  
FROM Recipient  
WHERE SenderID= 'MU02' or SenderID= 'ND50';

**Answer:**

- (i) SELECT SenderName FROM Sender WHERE SenderCity="Mumbai";
- (ii) SELECT RecID, SenderName, SenderAddress, RecName, RecAddress  
FROM Sender, Recipient WHERE Sender.SenderID=Recipient.SenderID;
- (iii) SELECT \* FROM Recipient ORDER BY RecNameAsc;
- (iv) SELECT RecCity, count (\*) FROM Recipient GROUP BY RecCity;
- (v) NewDelhi  
Mumbai
- (vi) RJain                      H Singh  
SJha                            P KSwamy
- (vii) S Mahajan                116, AVihar  
STripathi                      13, B1 D, Mayur Vihar
- (viii) ND08                      SMahajan  
ND45                            STripathi

6. Consider the following tables Consignor and Consignee. Write SQL commands for the statements (i)to(iv) and give outputs for SQL queries (v)to(viii).

---

**TABLE:CONSIGNOR**

CnorID	CnorName	CnorAddress	City
ND01	R Singhal	24,ABC Enclave	New Delhi
ND02	Amit Kumar	123, Palm Avenue	New Delhi
MU15	R Kohli	5/A, South Street	Mumbai
MU50	S Kaur	27-K, Westend	Mumbai

**TABLE:CONSIGNEE**

CneeID	CnorID	CneeName	CneeAddress	City
MU05	ND01	Rahul Kishore	5,Park Avenue	Mumbai
ND08	ND02	P Dhingra	16/J, Moore Enclave	New Delhi
KO19	MU15	A P Roy	2A, Central Avenue	Kolkata
MU32	ND02	S Mittal	P 245, AB Colony	Mumbai
ND48	MU50	B P Jain	13, Block D, A Vihar	New Delhi

- (i) To display the names of all Consignors from Mumbai.
  - (ii) To display the CneeID, CnorName, Cnoraddress, CneeName, CneeAddress for every Consignee.
  - (iii) To display Consignee details in ascending order of CneeName.
  - (iv) To display numbers of Consignors from each city.
  - (v) `SELECT DISTINCT City FROM Consignee;`
  - (vi) `SELECT A.CnorName, B.CneeName  
FROM Consignor A, Consignee B  
WHERE A.CnorID=B.CnorID AND B.CneeCity= 'Mumbai';`
  - (vii) `SELECT CneeName, CneeAddress  
FROM Consignee  
WHERE CneeCity NOT IN ( 'Mumbai', 'Kolkata');`
-



(viii) SELECT CneeID, CneeName  
FROM Consignee  
WHERE CnorId= 'MU15' OR CnorId= 'ND01';

Answer:

(i) SELECT CnorName  
FROM CONSIGNOR  
WHERE City= "Mumbai";

(ii) SELECT CneeID, CnorName, CnorAddress, CneeName, CneeAddress  
FROM CONSIGNOR, CONSIGNEE  
WHERE CONSIGNOR.CnorID= CONSIGNEE.CNorID

(iii) SELECT\*  
FROM CONSIGNEE  
ORDER BY CneeName ASC;

(iv) SELECT CneeCity, Count (CneeCity))  
FROM CONSIGNEE  
GROUP BY CneeCity

(v) There is no column by the name **City** in the table CONSIGNEE. However, if we change the column from City to **CneeCity**, the query results as:

**CneeCity**

Mumbai

New Delhi

Kolkata

(vi) R.Singhl           Rahul kishore  
AmitKumar           SMittal

(vii) P Dhingra        16/J Moore Enclave  
BP Jain 13, Block D, AVihar

(viii) MU05   Rahul kishore  
KO19   A P Roy

---

## Quick Review of Django Installation steps

### Steps for django installation

#### Install Python:

- Keep in mind-
1. Install for all users
  2. Check on Add path button
  3. Install in short path like any drive for ease

#### Checking Python installation:

```
python -- version
pip -- version
django-admin - -version
```

Before django installation create Virtual Environment. If django already installed , uninstall it, create environment and install django

#### Creating Virtual Environment:

Keep in Mind- Open command prompt as administrator and reach to script folder and run following commands:

```
D:/python/Scripts > pip install virtualenvwrapper-win
D:/python/Scripts> mkvirtualenv <envName>
D:/python/Scripts> workon <envName>
```

After setting environment, install django using following command:

```
D:/python/Scripts > pip install django
```

#### Checking django installation version:

```
D:/python/Scripts> django-admin - -version
```

**Creating a Project:** Give following command at D:/python/Scripts (if python installed in D:)

```
D:/python/Scripts> django-admin startproject <projectName>
For example: django-admin startproject first
```

**Meanwhile install VS4 code editor and give command [code .] at command prompt to open VS4 code editor.**

1. D:/python/Scripts> code .
2. Press Ctrl+~ to open terminal in VS4 code editor

**On terminal prompt :** Give command workon <envname>

For ex: workon **workshop**

**Creating an App:** Give following command at terminal to create an app

1. django-admin startapp <appname>  
for ex: django-admin startapp **small**
2. Copy urls.py of <projectName> i.e **first** into <appName> i.e **small** and change code as below:

```
from . import views
urlpatterns=[path("",views.index,name='index')]
```

3. Now change views.py of <appname> ie. **small**

```
from django.shortcuts import render
from django.http import HttpResponse
#create view
```

```
def index(request):
    return HttpResponse("Welcome to first app")
```

4. Now change urls.py of <projectname> i.e **first** as below

```
from django.urls import path,include
urlpatterns=[
    path("",include('small.urls')),
    path('admin/',admin.site.urls)
```

---

- ```
]
5. Give command D:/python/scripts/first> python manage.py runserver
6. Now open browser and type localhost:8000 in address bar.
7. Now connectivity done and you will get your message.
```

## Introduction to Database Programming in Python

Interacting with a database is an important feature in many programming languages including python. In comparison to storing data in flat files, its much easier to store, retrieve and modify data in a database. We are going to learn the following concepts and programming skills.

- . Creating a Database connection
- . Creating a Database
- . Create a Table
- . Inserting into the table
- . Retrieving data from Table
- . Updating Records in a table
- . Deleting Data in a table

Before you can start working with MySQL database, you need to start the database server. I am using MySQL server 5.1 for this tutorial. You also need to install the latest **mysql-connector** for this purpose. use **pip install pyMySQL** in the command window to download and install it.

### Connecting to the database server

```
In [23]: import pymysql
con = pymysql.connect(host="localhost", user="root", passwd="")
mycursor = con.cursor()
con.close()
```

### Creating a Database

```
In [3]: import pymysql
con = pymysql.connect(host="localhost", user="root", passwd="")
mycursor = con.cursor()
mycursor.execute("DROP DATABASE IF EXISTS student")
mycursor.execute("CREATE DATABASE student")
mycursor.execute("USE student")
```

### Creating the Table

```
In [11]: mycursor.execute("DROP TABLE IF EXISTS studentinfo")
mycursor.execute("CREATE TABLE studentinfo (name VARCHAR(30), age INT(3), gender CHAR(1))")
```

### Inserting data into the table

```
In [12]: sql = """INSERT INTO studentinfo(name,
        age, gender)
        VALUES('Ashok', 17, 'M')"""
mycursor.execute(sql)
con.commit()
```

### Inserting multiple rows simultaneously

Here we are going to use the `executemany()` function that accept two parameters as shown below.

```
In [15]: sql = """INSERT INTO studentinfo(name, age, gender)
VALUES(%s, %s, %s)"""
rows = [('Amit', 18, 'M'), ('Sudha', 17, 'F')]
mycursor.executemany(sql, rows)
con.commit()
con.close()
```

### Reading from Database Table

**fetchone()** – It fetches the next row of a query result set. A result set is an object that is returned when a cursor object is used to query a table. **fetchall()** – It fetches all the rows in a result set. If some rows have already been extracted from the result set, then it retrieves the remaining rows from the result set. In [17]:

```
import pymysql

con = pymysql.connect(host="localhost", user="root", passwd="", database="student")
mycursor = con.cursor()

sql = "SELECT * FROM studentinfo"

mycursor.execute(sql)

result = mycursor.fetchall()

for row in result:
    name = row[0]
    age = row[1]
    gender = row[2]
    print("Name=%s, Age=%d, Gender=%c" % (name, age, gender))
con.close()

Name=Ashok, Age=17, Gender=M
Name=Amit, Age=18, Gender=M
Name=Sudha, Age=17, Gender=F
Name=Amit, Age=18, Gender=M
Name=Sudha, Age=17, Gender=F
```

### Updating records in a Table

```
In [1]: import pymysql
con = pymysql.connect(host="local host", user="root", passwd="", database="student")
mycursor = con.cursor()

sql = "UPDATE studentinfo SET age=age-3 WHERE age='%d' " % (21)
mycursor.execute(sql)

sql = "SELECT * FROM studentinfo"
mycursor.execute(sql)

result = mycursor.fetchall()

for row in result:
    name = row[0]
    age = row[1]
    gender = row[2]
    print("Name=%s, Age=%d, Gender=%c" % (name, age, gender))
con.close()

Name=Ashok, Age=17, Gender=M
Name=Amit, Age=18, Gender=M
Name=Sudha, Age=17, Gender=F
Name=Amit, Age=18, Gender=M
Name=Sudha, Age=17, Gender=F
```

### Deleting Records from a Table

```
In [ ]: import pymysql
con = pymysql.connect(host="local host", user="root", passwd="", database="student")
mycursor = con.cursor()

sql = "DELETE FROM studentinfo WHERE name='%s' " % ('Ashok')
mycursor.execute(sql)

sql = "SELECT * FROM studentinfo"
mycursor.execute(sql)

result = mycursor.fetchall()

for row in result:
    name = row[0]
    age = row[1]
    gender = row[2]
    print("Name=%s, Age=%d, Gender=%c" % (name, age, gender))
con.close()
```

# UNIT: - 4

## SOCIETY LAW & ETHICS

### Computer Ethics

Computer ethics is a moral principle that defines the right and wrong activity which can be conducted by the use of computers. Positive impacts of Computer in the Society are the huge amount of work that can be stored in the computer.

**Social Effects(ATM, Visa Card, Master Card):** people can use automated teller machine cards for withdrawing money deposited with the help of ATM card, Visa Card or Master Card. Information and data can be kept secret with the special login name and password protection in the computers.

Negative impacts of Computer in the Society are:

- Computers are very expensive and cannot be affordable for general people
- Due to the malfunction of the electronic devices and computers, huge amount of data can be lost

**Cybercrime** or computer-oriented crime is a crime that includes a computer and a network. The computer may have been used in the execution of a crime or it may be the target. It is the use of a computer as a weapon for committing crimes such as committing fraud, identity theft or breaching privacy. It especially through the Internet, has grown in importance as the computer has become central to every field like commerce, entertainment and government. It may endanger a person or a nation's security and financial health.

Cyber crime encompasses a wide range of activities but these can generally be divided into two categories:

- Crimes that aim at computer networks or devices. These types of crimes involve different threats (like virus, bugs etc.) and denial-of-service (DoS) attacks.
- Crimes that use computer networks to commit other criminal activities. These types of crimes include cyber stalking, financial fraud or identity theft.

### Classification of Cyber Crime:

#### 1. Cyber Terrorism:

Cyber terrorism is the use of the computer and internet to perform violent acts that result in loss of life. This may include different types of activities either by software or hardware for threatening life of citizens.

---

In general, Cyber terrorism can be defined as an act of terrorism committed through the use of cyberspace or computer resources.

**2. Cyber Extortion:**

Cyber extortion occurs when a website, e-mail server or computer system is subjected to or threatened with repeated denial of service or other attacks by malicious hackers. These hackers demand huge money in return for assurance to stop the attacks and to offer protection.

**3. Cyber Warfare:**

Cyber warfare is the use or targeting in a battle space or warfare context of computers, online control systems and networks. It involves both offensive and defensive operations, threat of cyber-attacks, espionage and sabotage.

**4. Internet Fraud:**

Internet fraud is a type of fraud or deceit which makes use of the Internet and could include hiding of information or providing incorrect information for the purpose of deceiving victims for money or property. Internet fraud is not considered a single, distinctive crime but covers a range of illegal and illicit actions that are committed in cyberspace.

**5. Cyber Stalking:**

This is a kind of online harassment wherein the victim is subjected to a barrage of online messages and emails. In this case, these stalkers know their victims and instead of offline stalking, they use the Internet to stalk. However, if they notice that cyber stalking is not having the desired effect, they begin offline stalking along with cyber stalking to make the victims' lives more miserable.

**Prevention of Cyber Crime:**

Below are some points by means of which we can prevent cybercrime:

**1. Use strong password:**

Maintain different password and username combinations for each account and resist the temptation to write them down. Weak passwords can be easily cracked using certain attacking methods like Brute force attack, Rainbow table attack etc

**2. Use trusted antivirus indevices:**

Always use trustworthy and highly advanced antivirus software in mobile and personal computers. This leads to the prevention of different virus attack on devices.

**3. Keep social media private:**

Always keep your social media accounts data privacy only to your friends. Also make sure only to make friend who are known to you.

---

#### **4. Keep your device software updated:**

Whenever you get the updates of the system software, update it at the same time because sometimes the previous version can be easily attacked.

**Phishing** is a cyber attack that uses disguised email as a weapon.

Cyber forensics is a way or an electronic discovery technique which is used to determine and reveal technical criminal evidence.

Various capabilities of cyber forensics are.

- Computer forensics
- Computer exams.
- Data analysis.
- Data base study.
- Malware analysis.
- Mobile devices.
- Network analysis.
- Photography.
- Video analysis.

**Intellectual property (IP)** is a term referring to creation of the intellect (the term used in studies of the human mind) for which a mono poly is assigned to design ate downers by law. In some foreign countries intellectual property rights is referred to as industrial property, copyright, patent and trademarks, trade secrets all these cover music, literature and other artistic works, discoveries and inventions and words, phrases, symbols and designs. Intellectual Property Rights are themselves a form of property called intangible property. Al though many of the legal principles governing IP and IP R have evolved over centuries, it was not until the 19 th century that the term intellectual property began to be used and not until the late 20 th century that it became commonplace in the majority of the world. IP is divided into two categories for ease of understanding:

#### **1. Industrial Property**

#### **2. Copyright**

---



## Intellectual property shall include the right relating to:

- i. Literary, artistic and scientific works;
- ii. Performance of performing artists;
- iii. Inventions in all fields of human endeavour;
- iv. Scientific discoveries;
- v. Industrial designs;
- vi. Trademarks, service marks.;
- vii. Protection against unfair competition.

Intellectual property rights are protected in accordance with the provision so legislations of a country specific. In India, IPRs can be protected and monopolized as per the act. Some of them are

- 1- The Patent Act,1970,
- 2- The Designs Act,2000,
- 3- The Trade Mark Act,1999,
- 4- The Geographical Indications of Goods Act,1999,
- 5- The Copyright Act,1957,
- 6- Protection of Integrated Circuits Layout and Designs Act,2000,
- 7- Protection of Plant Varieties and Farmers Rights Act, 2001, and also Trade Secret

**Plagiarism** is the unethical practice of using words or ideas (either planned or accidental) of another author/researcher or your own previous works without proper acknowledgment. Plagiarism is a serious offence, considered as a serious academic and intellectual offense, It can result in highly negative consequences such as paper retractions and loss of author credibility and reputation.

Why is it important to understand Plagiarism?

- It is stealing of intellectual property
- It is cheating and an academic offence
- Plagiarism is Academic theft.

How to avoid plagiarism

- 1: Use your own ideas
  - 2: Cite the sources-When someone else's ideas are used, always acknowledge the sources and tell your reader WHERE THE IDEAS ARE FROM.
  - 3: Rewrite other's ideas in your own words
  - 4: Take careful notes
-

## 5: Develop your writing skills

Some commonly used free online plagiarism checker software are listed below but we have to register in few websites before using their services.

PaperRater.

PlagTracker

Quetext

Viper

PlagScan

Plagium

**Digital Rights management (DRM)** – A scheme that controls access to copyrighted material using technological means. It means applying technology on copyrighted material in such a way that it can be used or it remains in read only mode but further production/copying is restricted.

**HOW DIGITAL RIGHTS MANAGEMENT WORKS** Most general, digital rights management includes some codes that prohibit copying, or codes that limit the time or number of devices a certain product can be accessed. Publishers/authors of content creators use an application that encrypts e-book, content, data, software, media or any other copyrighted material. Only those with the decryption keys can access the material.

### **BENEFITS OF DIGITAL RIGHTS MANAGEMENT**

- It educates users about copyright and intellectualproperty.
  - It helps to make way for better licensing agreements and technologies.
  - It helps authors retain ownership of their works.
  - It helps to protect incomestreams.
  - It helps to secure files and keep themprivate.
-

## Licensing

A software license is a document that provides legally binding guidelines to the person who holds it for the use and distribution of software. It typically provides end users with the right to make one or more copies of the software without violating copyrights. It also defines the responsibilities of the parties entering into the license agreement and may impose restrictions on how the software can be used. Software licensing terms and conditions usually include fair use of the software, the limitations of liability, warranties and disclaimers and protections.

**GPL - General Public License (GNU GPL)**, is the most commonly used free software license, written by Richard Stallman in 1989 of Free Software Foundation for GNU Project. This license allows software to be freely used (means freedom for use, not price wise free), modified, and redistributed by anyone. WordPress is also an example of software released under the GPL license, that's why it can be used, modified, and extended by anyone.

### **Core values of GPL software are :**

Anyone can download and run the software

Anyone can modify it

Anyone can redistribute free copies of the software

Anyone can distribute modified versions of the software,

One of the primary aspects of the GPL is copy left. Copy left is a play on the word copyright, but with similar concept. It means same protection is applied over the softwares developed over the GPL software. For this reason any work based on Word Press inherits the GPL license. The GPL itself is under the copyright ownership of the Free Software Foundation (FSF), a tax-exempt charity organization founded by Stallman's GNU project in order to generate funding for free software development.

### **Advantages of publishing software under GPL (General Public License):**

- Regular feedback from users helps in the development of software in new areas.
  - Open source software aids to the free development of several other open source software.
  - It will get technical support from the developer's community.
  - The cost of software maintenance will be reduced as the volunteers' increases.
-

- Bugs can be identified easily as the number of people working on it increases.
- It is first Copy left license created for the open source community.
- Open source product itself will tempt the users to try and use it.

### **Disadvantage of using the GPL license.**

- If GPL licensed product is used in any commercial product then the entire product has to be released as open source. Most of the companies set a ban to use GPL product.
- Lots of people aren't aware of the stringent terms of GPL
- Its extremely viral. If your project contains a component that contains a component then whole project is subject to the GPL too.

**The Apache License** is a free and open source software (FOSS) licensing agreement from the Apache Software Foundation (ASF). Beginning in 1995, the Apache Group (later the Apache Software Foundation) Their initial license was essentially the same as the old BSD license. Apache did likewise and created the Apache License v1.1 - a slight variation on the modified BSD license. In 2004 Apache decided to depart from the BSD model a little more radically, and produced the Apache License v2.

### **Main Features Of The Apache License**

- copy, modify and distribute the covered software in source and/or binary forms
- exercise patent rights that would normally only extend to the licensor provided that:
- all copies, modified or unmodified, are accompanied by a copy of the license
- all modifications are clearly marked as being the work of the modifier
- all notices of copyright, trademark and patent rights are reproduced accurately in distributed copies

**The Information Technology Act, 2000** provides legal recognition to the transaction done via an electronic exchange of data and other electronic means of communication or electronic commerce transactions. Some of sections under IT act 2000 are given below.

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| SECTION | OFFENCE                                                              | PENALTY                                                                                                                                                                           |
|---------|----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 67A     | Publishing images containing sexual acts                             | Imprisonment up to seven years, or/and with fine up to Rs. 1,000,000                                                                                                              |
| 67B     | Publishing child porn or predating children online                   | Imprisonment up to five years, or/and with fine up to Rs.1,000,000 on first conviction. Imprisonment up to seven years, or/and with fine up to Rs.1,000,000 on second conviction. |
| 67C     | Failure to maintain records                                          | Imprisonment up to three years, or/and with fine.                                                                                                                                 |
| 68      | Failure/refusal to comply with orders                                | Imprisonment up to three years, or/and with fine up to Rs.200,000                                                                                                                 |
| 69      | Failure/refusal to decrypt data                                      | Imprisonment up to seven years and possible fine.                                                                                                                                 |
| 70      | Securing access or attempting to secure access to a protected system | Imprisonment up to ten years, or/and with fine.                                                                                                                                   |
| 71      | Misrepresentation                                                    | Imprisonment up to three years, or/and with fine up to Rs.100,000                                                                                                                 |

## Case studies

### Arab Spring

The term "Arab Spring" is an allusion to the Revolutions of 1848, which are sometimes referred to as the "Springtime of Nations", and the Prague Spring in 1968. It was used by various commentators and bloggers who anticipated a major Arab movement towards democratization. The use of social media platforms more than doubled in Arab countries during the protests, with the exception of Libya. Some researchers have shown how collective intelligence, dynamics of the crowd in participatory systems such as social media, have immense power to support a collective action – such as foment a political change. Facebook, Twitter and other major social media played a key role in the movement of Egyptian and Tunisian activists in particular. Nine out of ten Egyptians and Tunisians responded to a poll that they used Facebook to organize protests and spread awareness. This large population of young Egyptian men referred to themselves as "the Facebook generation", exemplifying their escape from their non-modernized past.

### Bitcoin

Bitcoin is a crypto currency, or a digital currency, that uses rules of cryptography for regulation and generation of units of currency. Bitcoin falls under the scope of cryptocurrency and was the first and most valuable among them. It is commonly called a decentralized digital currency. Bitcoin is a cryptocurrency, a form of electronic cash. It is a decentralized digital currency without a central bank or single administrator. Bitcoins are completely virtual coins designed to be 'self-contained' for their value, with no need for banks to move and store the money. Once you own bit coins, they possess value and trade just as if they were nuggets of gold in your pocket. You can use your bitcoins to purchase

goods and services online, or you can tuck them away and hope that their value increases over the years. Bitcoins are traded from one personal 'wallet' to another.

### Very Short Answer type Questions (1 mark)

1. In which year the Indian IT Act, 2000 got updated?
  2. What is data privacy?
  3. Jai Khanna is confused between the terms Domain Name and URL. Explain the difference with the help of appropriate examples of each.
  4. Define any two threats to Network Security.
  5. Which of the following is not a type of peer-to-peer cyber-crime?
    - a) Phishing
    - b) Injecting Trojans to a target victim
    - c) MiTM
    - d) Credit card details leak in deep web**
  6. What is the punishment in India for stealing computer documents, assets or any software's source code from any organization, individual, or from any other means?
    - a) 6 months of imprisonment and a fine of Rs.50,000
    - b) 1 year of imprisonment and a fine of Rs.100,000
    - c) 2 years of imprisonment and a fine of Rs.250,000
    - d) 3 years of imprisonment and a fine of Rs.500,000**
  7. What is the ethics behind training how to hack a system?
    - a) To think like hackers and know how to defend such attacks**
    - b) To hack a system without the permission
    - c) To hack a network that is vulnerable
    - d) To corrupt software or service using malware
  8. \_\_\_\_\_ has now evolved to be one of the most popular automated tools for unethical hacking.
    - a) Automated apps
    - b) Data base software
    - c) Malware**
    - d) Worms
  9. \_\_\_\_\_ is the technique used in business organizations and firms to protect IT assets.
    - a) Ethical hacking
    - b) Unethical hacking
-

- c) Fixing bugs
- d) Internal data-breach

10. You may throw some confidential file in a dustbin which contains some of your personal data. Hackers can take your data from that thrown-away file also, using the technique\_\_\_\_\_

- a) Dumpster diving
- b) Shoulder surfing
- c) Phishing
- d) Spamming

View Answer

(\*Dumpster diving is a social engineering technique used by hackers to grab your personal and confidential data from that thrown-away file also. Using these data attackers may use password guessing or fraud calls (if they find your personal phone number).

11. Which of the following is not a type of cyber crime?

- a) Data theft
- b) Forgery
- c) Damage to data and systems
- d) Installing antivirus for protection

Answer: d

Explanation: Cyber crimes is one of the most threatening terms that is an evolving phase. It is said that major percentage of the World War III will be based on cyber-attacks by cyber armies of different countries.

12. Cyber-laws are incorporated for punishing all criminals only.

- a) True
- b) False

Answer: b

Explanation: Cyber-laws were incorporated in our law book not only to punish cyber criminals but to reduce cyber crimes and tie the hands of citizens from doing illicit digital acts that harm or damage other's digital property or identity.

13. Cyber-crime can be categorized into \_\_\_\_\_ types.

- a) 4
- b) 3
- c) 2
- d) 6

Answer: c

Explanation: Cyber crime can be categorized into 2 types. These are peer-to-peer attack and computer as weapon. In peer-to-peer attack, attackers target the victim users; and in computer as weapon attack technique, computers are used by attackers for a mass attack such as illegal and banned photo leak, IPR violation, pornography, cyber terrorism etc.

14. Which of the following is not an example of a computer as weapon cyber-crime?

- a) Credit card fraudulent

- b) Spying someone using key logger
- c) IPR Violation
- d) Pornography

Answer: b

Explanation: DDoS (Distributed Denial of Service), IPR violation, pornography are mass attacks done using a computer. Spying someone using keylogger is an example of peer-to-peer attack.

15. Which of the following is not done by cyber criminals?

- a) Un authorized account access
- b) Mass attack using Trojans as botnets
- c) Email spoofing and spamming
- d) Report vulnerability in any system

Answer: d

Explanation: Cyber-criminals are involved in activities like accessing online accounts in unauthorized manner; use Trojans to attack large systems, sending spoofed emails. But cyber-criminals do not report any bug is found in a system, rather they exploit the bug for their profit.

16. What is the name of the IT law that India is having in the Indian legislature?

- a) India's Technology (IT) Act, 2000
- b) India's Digital Information Technology (DIT) Act, 2000
- c) India's Information Technology (IT) Act, 2000
- d) The Technology Act, 2008

Answer: c

Explanation: The Indian legislature thought of adding a chapter that is dedicated to cyber law. This finally brought India's Information Technology (IT) Act, 2000 which deals with the different cyber-crimes and their associated laws.

17. In which year India's IT Act came into existence?

- a) 2000
- b) 2001
- c) 2002
- d) 2003

Answer: a

Explanation: On 17th Oct 2000, the Indian legislature thought of adding a chapter that is dedicated to cyber law, for which India's Information Technology (IT) Act, 2000 came into existence.

18. What is the full form of ITA-2000?

- a) Information Tech Act -2000
- b) Indian Technology Act-2000
- c) International Technology Act-2000
- d) Information Technology Act -2000

Answer: d

Explanation: Information Technology Act -2000 (ITA-2000), came into existence on 17<sup>th</sup> Oct 2000, that is dedicated to cyber-crime and e-commerce law in India.

---



19. In which year the Indian IT Act, 2000 got updated?

- a)2006
- b)2008
- c)2010
- d)2012

Answer: b

Explanation: In the year 2008, the IT Act, 2000 was updated and came up with a much broader and precise law on different computer-related crimes and cyber offenses.

20. What type of cyber-crime, its laws and punishments does section 66 of the Indian IT Act holds?

- a) Cracking or illegally hack into any system
- b) Putting antivirus into the victim
- c) Stealing data
- d) Stealing hardware components

Answer: a

Explanation: Under section 66 of IT Act, 2000 which later came up with a much broader and precise law says that cracking or illegally hacking into any victim's computer is a crime. It covers a wide range of cyber-crimes under this section of the IT Act.

### **MLL BASED QUESTIONS (Short Answer Type Questions-2 MARKS)**

1. **What is identity theft? How can we prevent identity theft?**
  2. **What is a Phishing email and how do you Spot the Scam?**
  3. What is net neutrality and why is it important? List any three benefits of implementing "Internet Neutrality"?
  4. **Define crowd sourcing. Explain its drawbacks and benefits.**
  5. **What is the difference between threat, vulnerability and risks.**
  6. Define e- waste. What are the various methods for effective e- waste management.
  7. What do you mean by plagiarism? Tell 2 acts which can be termed as plagiarism.
  8. What do you mean by Digital property rights? Explain.
  9. State any 2 measures of digital property rights protection.
  10. Differentiate between shareware and proprietary software.
  11. What is cyber crime? Explain "information theft".
  12. Give any 2 benefits of ICT on today's society?
-

13. State 2 benefits of e-waste recycling?
14. Are there any gender issues involved in learning computer related subject? Give solution to overcome the issue.
15. Give examples of software, hardware that may be used for special needs students.
16. How could you find a web is safe or not site when you enter crucial information?
17. What are the biometrics devices?
18. What are gender issues while teaching and using computers?
19. What are gender disability issues while teaching and using computers?
20. What do you mean by internet as an echo chamber?

**Long Answer Type Questions:( 3/4/6 Marks)**

1. List any five features that make biometric system more authenticated and trusted.
  2. Define the following:
  3. (i) Cyber forensic (ii) Phishing (iii) Encoding, encryption and hashing
  4. What is the difference between Phishing and Vishing?
  5. What is illegal download ? What are the method to avoid it?
  6. What is child pornography ? and what are the safety measures for it?
  7. What do you mean by cyber scam and how to avoid it?
  8. What are the use fulness of cyber forensics?
  9. What is relation between Technology and society?
  10. What are the social and cultural changes induced by technology?
  11. What are the roles of new media in society?
  12. What is the problem of internet addiction ? how to overcome it?
-

## Review Exercise

- (1) on case sensitive when dealing with identifiers?
- a) yes
  - b) no
  - c) machine dependent
  - d) none of the above
- (2) What is the maximum possible length of an identifier?
- a) 31 characters
  - b) 63 characters
  - c) 79 characters
  - d) none of the above
- (3) Which is the correct operator for power(xy)?
- a) X^y
  - b) X\*\*y
  - c) X^^y
  - d) None of the above
- (4) What is the order of precedence in python?
- |                     |                 |
|---------------------|-----------------|
| i) Parentheses      | iv) Division    |
| ii) Exponential     | v) Addition     |
| iii) Multiplication | vi) Subtraction |
- a) i,ii,iii,iv,v,vi
  - b) ii,i,iii,iv,v,vi
  - c) ii,i,iv,iii,v,vi
  - d) i,ii,iii,iv,vi,v
- (5) Which of these in not a core data type?
- a) Lists
  - b) Dictionary
  - c) Tuples
  - d) Class
- (6) Which of the following will run without errors ?
- a) round(45.8)
  - b) round(6352.898,2,5)
  - c) round()
  - d) round(7463.123,2,1)
- (7) Which of the following is not a complex number?
- a)  $k = 2 + 3j$
  - b)  $k = \text{complex}(2, 3)$
  - c)  $k = 2 + 3l$
  - d)  $k = 2 + 3J$
- (8) What is the type of int?
- a) Boolean
-

- b) Integer
  - c) Float
  - d) Complex
- (9) Which of the following operators has its associativity from right to left?
- a) +
  - b) //
  - c) %
  - d) \*\*
- (10) The value of the expressions  $4/(3*(2-1))$  and  $4/3*(2-1)$  is the same. State whether true or false.
- a) True
  - b) False
- (11) What is an expression?
- (12) Rewrite the following code in Python after removing all syntax errors(s). Underline each correction done in the code.
- ```
for Name in [Ramesh, Suraj, Priya]
if Name [0] == 'S':
    Print (Name)
```
- (13) When should we use `"""` (triple quotes) to define strings?
- (14) What is the difference between  $10 / 3$  and  $10 // 3$ ?
- (15) What are the built-in type does python provides?
- (16) What is dictionary in python?
- (17) What are negative indexes and why are they used?
- (18) What is the output of the following?
- ```
x = ['ab','cd']
for i in x:
    i.upper()
print(x)
```
- (19) Write a function called `show_stars` (rows). If rows is 5, it should print the following:
- ```
*
**
***
****
*****
```
- (20) Convert the following while loop into for loop:
- ```
i = 0
while i < 100:
    if i % 2 == 0:
        print(i, "is even")
    else:
        print(i, "is odd")
    i = i + 1
```

## Worksheet on Python Data Frames

1. Which of the following input can be accepted by DataFrame?
    - a) Structured ndarray
    - b) Series
    - c) Data Frame
-

- d) All of the above
2. Point out the wrong statement:
    - a) A Data Frame is like a fixed-size dict in that you can get and set values by index label
    - b) Series can be passed into most NumPy methods expecting an ndarray
    - c) A key difference between Series and ndarray is that operations between Series automatically align the data based on label
    - d) None of the above
  3. Which of the following object you get after reading CSV file?
    - a) Data Frame
    - b) Character Vector
    - c) Panel
    - d) All of the above
  4. Point out the wrong statement:
    - a) Series is 1D labeled homogeneously-typed array
    - b) DataFrame is general 2D labeled, size-mutable tabular structure with potentially heterogeneously-typed columns
    - c) Panel is generally 2D labeled, also size-mutable array
    - d) None of the above
  5. Which code deletes a column from a dataframe?
    - a) `df.drop(array('col1'),axis=1)`
    - b) `df.delete(array('col1'),axis=1)`
    - c) `df.remove(array('col1'),axis=1)`
    - d) None of the above
  6. What attribute is used to obtain the rows and columns count of a pandas dataframe?
    - a) Shape
    - b) Dimension
    - c) Size
    - d) Count
  7. Which method used to drop missing values in a pandas dataframe?
    - a) `dropnan()`
    - b) `dropna()`
    - c) `drop()`
    - d) `dropnull()`
  8. Which method is used to rename columns in a pandas dataframe?
    - a) `move()`
    - b) `change()`
    - c) `rename()`
    - d) None of the above
  9. Which attribute is used to check the data type of each and every column in a pandas dataframe?
    - a) `types`
    - b) `datatypes`
    - c) `dtypes`
    - d) None of the above
  10. By which function we can create dataframe?
    - a) `df`
    - b) `dataframe`
    - c) `DataFrame`
    - d) None of the above
-

11. How can we replace all occurrence sofa String in a DataFrame.Explain with suitable example.
  12. Write a Pandas program to create and display a DataFrame from a specified dictionary data which has the index labels.  
exam\_data = {'name': ['Dima', 'James', 'Emily', 'Laura', 'Kevin'], 'score': [9, 16.5, np.nan, 14.5, np.nan], 'attempts': [1, 3, 2, 3, 1], 'qualify': ['yes', 'no', 'yes', 'no', 'no']}  
labels = ['a', 'b', 'c', 'd', 'e']
  13. Write a Pandas program to change the score in row 'd' to11.5.  
exam = {'name': ['Anastasia', 'Dima', 'Emily', 'Laura', 'Kevin'], 'score': [np.nan, 9, 20, 14.5, np.nan, 19], 'attempts': [1, 3, 2, 3, 2], 'qualify': ['no', 'yes', 'yes', 'no', 'no']}  
labels = ['a', 'b', 'd', 'i', 'j']
  14. Write down the output of the following code:  
import pandas as pd  
data = {'Name':['Tom', 'Jack', 'Steve', 'Ricky'],'Age':[28,34,29,42]}  
df = pd.DataFrame(data)  
print df
  15. How can we create a dataframe from the list of dicts. Explain with suitable examples.
  16. A)Create two data frames using following two Dictionary,  
B)Merge two data frames,and append second data frame as a new column to first dataframe.  
Car\_Price = {'Company': ['Toyota', 'Honda', 'BMW', 'Audi'], 'Price': [23845, 17995, 13592571400]}  
car\_Horsepower = {'Company': ['Toyota', 'Honda', 'BMW', 'Audi'], 'horsepower': [141, 80, 182 , 160]}
  17. Find the index position where the minimum and maximum values exist in Pandas DataFrame.
  18. How to select or filter rows from a DataFrame based on values in columns in pandas?
  19. How can we handle missing data in dataframes.
  20. How do we write DataFrame to CSV files in pandas.
-

## Worksheet on NumPy Array

1. Which of the following is contained in NumPy library?
    - a) n-dimensional array object
    - b) tools for integrating C/C++ and Fortran code
    - c) courier transform
    - d) all of the Mentioned
  2. The \_\_\_\_\_ function returns its argument with a modified shape, where as the \_\_\_\_\_ method modifies the array itself.
    - a) reshape,resize
    - b) resize, reshape
    - c) reshape2, resize
    - d) all of the Mentioned
  3. To create sequences of numbers, NumPy provides a function analogous to range that returns arrays instead of lists.
    - a) arrange
    - b) aspace
    - c) align
    - d) all of the above
  4. ndarray is also known as the alias array.
    - a) True
    - b) False
  5. Which of the following method creates a new array object that looks at the same data?
    - a) view
    - b) copy
    - c) paste
    - d) all of the above
  6. Point out the wrong statement:
    - a) A universal function is a function that operates on and arrays in an element-by-element fashion
    - b) In NumPy, universal functions are instances of the NumPy. functionclass
    - c) Many of the built-in functions are implemented in compiled Code
    - d) All of the Mentioned
  7. Which of the following returns an array of ones with the same shape and type as a given array?
    - a) all\_like
    - b) ones\_like
    - c) one\_alike
    - d) all of the Mentioned
  8. Which of the following thing can be data in Pandas?
    - a) a python dict
    - b) an ndarray
    - c) a scalar value
    - d) all of the above
-

9. The result of an operation between unaligned Series will have the \_\_\_\_\_ of the indexes involved.
    - a) intersection
    - b) union
    - c) total
    - d) all of the Mentioned
  10. If data is an ndarray, index must be the same length as data.
    - a) True
    - b) False
  11. Write a NumPy program to test if any of the elements of a given array is non-zero.
  12. Write a NumPy program to test element-wise for NaN of a given array.
  13. Write a NumPy program to create an element-wise comparison (greater, greater\_equal, less and less\_equal) of two given arrays.
  14. Write a NumPy program to create a 5x5 zero matrix with elements on the main diagonal equal to 1, 2, 3, 4,5.
  15. Write a NumPy program to compute sum of all elements, sum of each column and sum of each row of a given array.
  16. Write a NumPy program to create a 2d array with 1 on the border and 0 inside. Expected Output: Original array:
 

```
[[ 1.  1.  1.  1.  1.]
 [ 1.  1.  1.  1.  1.]
 [ 1.  1.  1.  1.  1.]]
```

 1 on the border and 0 inside in the array
 

```
[[ 1.  1.  1.  1.  1.]
 [ 1.  0.  0.  0.  1.]
 [ 1.  1.  1.  1.  1.]]
```
  17. Write a NumPy program to save a given array to a binary file.
  18. Write a NumPy program to append values to the end of an array.
  19. Write a NumPy program to find common values between two arrays.
 

ExpectedOutput:

```
Array1: [ 0 10 20 40 60]
Array2: [10, 30, 40]
```

Common values between two arrays:

```
[10,40]
```
  20. Write a NumPy program to find the set difference of two arrays. The set difference will return the sorted, unique values in array1 that are not in array2.
 

Expected Output:

```
Array1: [ 0 10 20 40 60 80]
Array2: [10, 30, 40, 50, 70, 90]
```

Set difference between two arrays:

```
[ 0 20 60 80]
```
-



## Worksheet on Data Visualization using Pyplot

1. The plot method on Series and DataFrame is just a simple wrapper around:
    - a) gplt.plot()
    - b) plt.plot()
    - c) plt.plotgraph()
    - d) none of the above
  2. Point out the correct combination with regards to kind keyword for graph plotting:
    - a) 'hist' for histogram
    - b) 'box' for boxplot
    - c) 'area' for area plots
    - d) all of the above
  3. Which of the following value is provided by kind keyword for bar plot?
    - a) barh
    - b) kde
    - c) hexbin
    - d) none of the above
  4. You can create a scatter plot matrix using the \_\_\_\_\_ method in pandas.tools.plotting.
    - a) sca\_matrix
    - b) scatter\_matrix
    - c) DataFrame.plot
    - d) all of the above
  5. Point out the wrong combination with regards to kind keyword for graph plotting:
    - a) 'scatter' for scatterplots
    - b) 'kde' for hexagonal bin plots
    - c) 'pie' for pie plots
    - d) none of the above
  6. Which of the following plots are used to check if a data set or time series is random?
    - a) Lag
    - b) Random
    - c) Lead
    - d) None of the above
  7. Plots may also be adorned with error bars or tables.
    - a) True
    - b) False
  8. Which of the following plots are often used for checking randomness in ime series?
    - a) Autocausation
    - b) Autorank
    - c) Autocorrelation
    - d) None of theabove
  9. plots are used to visually assess the uncertainty of a statistic.
    - a) Lag
-

- b) RadViz
  - c) Bootstrap
  - d) None of the above
10. Andrews curves allow one to plot multi variate data.
    - a) True
    - b) False
  11. Write a Python program to add textures (black and white) to bars and wedges.
  12. Write a Python programming to create a pie chart of gold medal achievements of five most successful countries in 2016 Summer Olympics. Read the data from a csvfile.  
 Sample data:  
 medal.csv  
 country gold\_medal  
 United States,46  
 Great Britain,27  
 China,26  
 Russia,19  
 Germany,17
  13. Write a Python program to draw a scatter graph taking a random distribution in X and Y and plotted against each other.
  14. Write a Python program to draw a line using given axis values with suitable label in the x axis , y axis and a title.
  15. Write a Python program to draw line charts of the financial data of Alphabet Inc. between October 3, 2016 to October 7, 2016.  
 Sample Financial data (fdata.csv):  
 Date,Open,High,Low,Close  
 10-03-16,774.25,776.065002,769.5,772.559998  
 10-04-16,776.030029,778.710022,772.890015,776.429993  
 10-05-16,779.309998,782.070007,775.650024,776.469971  
 10-06-16,779,780.47998,775.539978,776.859985  
 10-07-16,779.659973,779.659973,770.75,775.080017
  16. Write a Python programming to display a bar chart of the popularity of programming Languages.  
 Sample data:  
 Programming languages: Java, Python, PHP, JavaScript, C#, C++  
 Popularity: 22.2, 17.6, 8.8, 8, 7.7, 6.7
  17. Write a Python programming to create a pie chart with a title of the popularity of programming Languages.  
 Sample data:  
 Programming languages: Java, Python, PHP, JavaScript, C#, C++  
 Popularity: 22.2, 17.6, 8.8, 8, 7.7, 6.7
  18. What is ScatterPlot?
  19. Write a Python program to draw a scatter plot using random distributions to generate balls of different sizes.
  20. Write a Python program to draw a scatter plot for three different groups comparing weights and heights.
-

## WORKSHEET: SOFTWARE ENGINEERING

| Q no | Question                                                                                       |
|------|------------------------------------------------------------------------------------------------|
| 1.   | What is Software Engineering ?                                                                 |
|      |                                                                                                |
| 2.   | Define Scalability in terms of Software Process?                                               |
|      |                                                                                                |
| 3.   | How Functional requirement differs from Non-functional requirement in S/w development process? |
|      |                                                                                                |
| 4.   | How is Verification different from Validation process?                                         |
|      |                                                                                                |
| 5.   | Which model follows linear and sequential approach of s/w development? Why is it named so?     |
|      | Mention any two advantages and disadvantages of the above model.                               |

|    |                                                                                                                  |
|----|------------------------------------------------------------------------------------------------------------------|
|    |                                                                                                                  |
| 6. | Differentiate between Evolutionary model and Component based s/w model.                                          |
|    |                                                                                                                  |
| 7. | What is a Delivery Model? Write the names of any two delivery models.                                            |
|    |                                                                                                                  |
| 8. | Which model is best suited for very large, complex and expensive software systems? Explain briefly its features. |
|    |                                                                                                                  |
| 9  | What are the four fundamental activities of a Software Process? Explain them in brief.                           |
|    |                                                                                                                  |

## WORKSHEET: AGILE METHODS & PRACTICAL

| Q no. | Question                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.    | What is Agile Software Development ?                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 2.    | Ranjita and Nandini are the two programmers working together at one problem for developing software. Answer the following questions on the basis of the above statement.<br>a) What is the type of software development process known as?<br>b) Define the type of software development process mentioned above.<br>c) Mention any two advantages of the s/w development process mentioned above.<br>d) Mention any two disadvantages of the s/w development process mentioned above. |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 3.    | Define Scrum in terms of software development. Write the members required in a Scrum Team.                                                                                                                                                                                                                                                                                                                                                                                            |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 4.    | Explain the importance of Sprints as a Scrum Event.                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 5.    | Define the following in terms of Version Control System:<br>(i) Workcopy            (ii) Repository                                                                                                                                                                                                                                                                                                                                                                                   |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|    |                                                                                           |
|----|-------------------------------------------------------------------------------------------|
|    |                                                                                           |
| 6. | Differentiate between Commit and Update in terms of Centralized Version Control System.   |
|    |                                                                                           |
| 7. | Differentiate between Push and Pull requests of a Distributed Version Control System.     |
|    |                                                                                           |
| 8. | What is Git? Mention any two features of Git.                                             |
|    |                                                                                           |
| 9  | What is a Use-Case diagram? Who is an Actor and what is a use-case of a Use-Case diagram? |
|    |                                                                                           |
| 10 | Draw a Use-Case diagram depicting basic Banking System <b>OR</b> an ATM system.           |
|    |                                                                                           |

## Worksheet on Django ORM, HTML & CSS

1. What is the Django shortcut method to more easily render an html response?  
A. render\_to\_html  
B. render\_to\_response  
C. response\_render  
D. render
  2. Choose the correct tag for the largest heading in HTML.  
a) h6  
b) heading  
c) h1  
d) head
  3. Which of the following are table tags?  
a) table, thead, tr, td  
b) colspan, table, tr  
c) table, tt, tr, td  
d) thead, colspan, td, tr
  4. In css, "color:red" can be called as  
a) Selector  
b) Rule  
c) Declaration  
d) Value
  5. In CSS, "font-size" can be called as  
a) Selector  
b) Rule  
c) Property  
d) Property-Name
  6. Which of the following tag is used to embed css in html page?  
a) <script>  
b) <style>  
c) <css>  
d) <!DOCTYPE html>
  7. What Constitutes Django Templates?
  8. How Can You Set Up The Database In Django?
  9. What Are The Features Available In Django WebFrame work?
  10. Write a view function that can process a GET request and display "main.html" as template. Required files(s) and method(s) are already imported.
  11. How Do You Use Views In Django?
  12. How to specify the column properties of each column within a colgroupelement?
  13. How to embed audio in a HTML document?
  14. How to center the alignments for one of the items inside a flexible element
  15. How to set the background-attachment property whether a background image is fixed or scrolls with the rest of the page?
  16. How to set the style of the top border?
-

## Worksheet on Cloud Computing, Networking & Troubleshooting

1. \_\_\_\_\_ computing refers to applications and services that run on a distributed network using virtualized resources.
    - a) Distributed
    - b) Cloud
    - c) Soft
    - d) Parallel
  2. Which of the following is an essential concept related to Cloud?
    - a) Reliability
    - b) Productivity
    - c) Abstraction
    - d) All of the above
  3. Which of the following cloud concept is related to pooling and sharing of resources?
    - a) Polymorphism
    - b) Abstraction
    - c) Virtualization
    - d) None of the above
  4. Cloud computing is a \_\_\_\_\_ system and it is necessarily unidirectional in nature.
    - a) stateless
    - b) stateful
    - c) reliable
    - d) all of the mentioned
  5. In the layer hierarchy as the data packet moves from the upper to the lower layers, headers are
    - a) Added
    - b) Removed
    - c) Rearranged
    - d) Modified
  6. Communication between a computer and a keyboard involves transmission
    - a) Automatic
    - b) Half-duplex
    - c) Full-duplex
    - d) Simplex
  7. A \_\_\_\_\_ is a device that forwards packets between networks by processing the routing information included in the packet.
    - a) bridge
    - b) firewall
-



- c) router
  - d) all of the mentioned
8. Dynamic webpage
- a) is same every time whenever it displays
  - b) generates on demand by a program or a request from browser
  - c) is same every time whenever it displays and generates on demand by a program or a request from browser
  - d) none of the above
9. What is data encryption standard(DES)?
- a) block cipher
  - b) stream cipher
  - c) bit cipher
  - d) none of the mentioned
10. Which among the following has the strongest wireless security?
- a) WEP
  - b) WPA
  - c) WPA2
  - d) WPA3
11. What are the benefits of cloud computing?
12. What are the essential things that must be followed before going to cloud computing platform?
13. Explain the Security management in terms of Cloud Computing.
14. What are hybrid clouds?
15. What is the difference between cloud computing and mobile computing?
16. What are the layers in OSI Reference Models? Describe each layer briefly.
17. What is the difference between Hub, Switch, and Router?
18. What is a Firewall?
19. Name Three Steps Which You Would Use To Troubleshoot Internet Related Problems?
20. What is the importance of Encryption on a network?
-

## CLASS XII INFORMATICS PRACTICES GUIDELINES FOR PRACTICALS

| S.No.                               | Unit Name                                                                                                                                                                                                                      | Marks     |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Lab Test (10 marks)</b>          |                                                                                                                                                                                                                                |           |
| 1                                   | Python programs for data handling (60% logic + 20% documentation + 20% code quality)                                                                                                                                           | 7         |
|                                     | Small Python program that sends a SQL query to a database and displays the result. A stub program can be provided.                                                                                                             | 3         |
| <b>Report File + viva (9 marks)</b> |                                                                                                                                                                                                                                |           |
| 2                                   | Report file: Minimum 21 Python programs. Out of this at least 4 programs should send SQL commands to a database, and retrieve the result; at least 1 program should implement the web server to write user data to a CSV file. | 7         |
|                                     | <b>Viva voce based on the report file</b>                                                                                                                                                                                      | 2         |
| <b>Project + viva (11 marks)</b>    |                                                                                                                                                                                                                                |           |
| 3                                   | Project (that uses most of the concepts that have been learnt)                                                                                                                                                                 | 8         |
|                                     | Project viva voce                                                                                                                                                                                                              | 3         |
| <b>TOTAL</b>                        |                                                                                                                                                                                                                                | <b>30</b> |

### **Data Management:SQL+web-server**

- Find the min, max, sum, and average of the marks in a student markstable.
- Find the total number of customers from each country in the table (customer ID, customer Name, country) using groupby.
- Write a SQL query to order the (student ID, marks) table in descending order of themarks.
- Integrate SQL with Python by importing MySQLdB
- Write a Django based web server to parse a user request (POST), and write it to a CSVfile.

### **Data handling using Python libraries**

- Use map functions to convert all negative numbers in a Data Frame to the mean of all the numbers.
- Consider a Data Frame, where each row contains the item category, item name, and expenditure.
- Group the rows by the category, and print the total expenditure percategory.
- Given a Series, print all the elements that are above the 75<sup>th</sup>percentile.
- Given a day's worth of stock market data, aggregate it. Print the highest, lowest, and closing prices of eachstock.
- Given sample data, plot a linear regressionline.
- Take data from government web sites, aggregate and summarize it. Then plot it using different plotting functions of the PyPlotlibrary.

## Basic SoftwareEngineering

- Business use-case diagrams for an airline ticket booking system, train reservation system, stock exchange
- Collaboratively write a program and manage the code with a version control system(GIT)

## Project

The aim of the class project is to create something that is tangible and useful. This should be done in groups of 2 to 3 students, and should be started by students at least 6 months before the submission deadline. The aim here is to find a real world problem that is worth while to solve. Students are encouraged to visit local businesses and ask them about the problems that they are facing. For example, if a business is finding it hard to create invoices for filing GST claims, then students can do a project that takes the raw data (list of transactions), groups the transactions by category, accounts for the GST tax rates, and creates invoices in the appropriate format. Students can be extremely creative here. They can use a wide variety of Python libraries to create user friendly applications such as games, software for their school, software for their disabled fellow students, and mobile applications, Of course to do some of this projects, some additional learning is required; this should be encouraged. Students should know how to teach themselves.

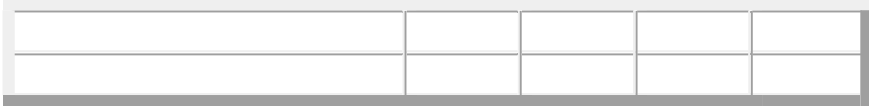
If three people work on a project for 6 months, at least 500 lines of code is expected. The committee has also been made aware about the degree of plagiarism in such projects. Teachers should take a very strict look at this situation, and take very strict disciplinary action against students who are cheating on lab assignments, or projects, or using pirated software to do the same. Everything that is proposed can be achieved using absolutely free, and legitimate open source software.

## SUGGESTED PRACTICALS

|   |                                                                                                                                                                                                                                     |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Write a NumPy program to create a 3x3 matrix with values ranging from 2 to 10                                                                                                                                                       |
| 2 | Write a NumPy program to generate six random integers between 25 and 55.                                                                                                                                                            |
| 3 | Write a Pandas program to convert a Pandas module Series to Python list and it's type                                                                                                                                               |
| 4 | Write a Pandas program to compare the elements of the two Pandas Series??                                                                                                                                                           |
| 5 | Write a Python program to convert a dictionary to a Pandas series. Sample Series:<br>Dictionary:<br>{'a': 100, 'b': 200, 'c': 300, 'd': 400, 'e': 800}<br>Converted series:<br>a100<br>b200<br>c300<br>d400<br>e800<br>dtype: int64 |
| 6 | Write a Pandas program to add, subtract, multiple and divide two Pandas Series                                                                                                                                                      |
| 7 | Write a program to sort the element of Series S1 into S2                                                                                                                                                                            |
| 8 | Write a NumPy program to reverse an array Ar                                                                                                                                                                                        |

|    |                                                                                                                                                                                                                                                                                                 |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9  | <p>Write a NumPy program to create a 8x8 matrix and fill it with a checkerboard pattern.</p> <p>Checkerboard pattern:</p> <pre> [[0 1 0 1 0 1 0 1]  [1 0 1 0 1 0 1 0]  [0 1 0 1 0 1 0 1]  [1 0 1 0 1 0 1 0]  [0 1 0 1 0 1 0 1]  [1 0 1 0 1 0 1 0]  [0 1 0 1 0 1 0 1]  [1 0 1 0 1 0 1 0]] </pre> |
| 10 | <p>Write a NumPy program to append values to the end of an array. Expected Output:</p> <p>Original array:<br/>[10, 20, 30]</p> <p>After append values to the end of the array:<br/>[102030405060708090]</p>                                                                                     |
| 11 | <p>Write a NumPy program to test whether each element of a 1-D array is also present in a second array</p>                                                                                                                                                                                      |
| 12 | <p>Write a NumPy program to find the number of elements of an array, length of one array element in bytes and total bytes consumed by the elements</p>                                                                                                                                          |
| 13 | <p>Write a Pandas program to select the rows where the height is not known, i.e. is NaN.</p> <pre> 'name': ['Asha', 'Radha', 'Kamal', 'Divy', 'Anjali'], 'height': [ 5.5, 5, np.nan, 5.9, np.nan], 'age': [11, 23, 22, 33, 22] </pre>                                                           |

| 14                   | <p>Write a Pandas program to select the name of persons whose height is between 5 to 5.5 (both values inclusive)</p> <pre>'name':['Asha','Radha','Kamal','Divy','Anjali'], 'height':[5.5,5,np.nan,5.9,np.nan], 'age': [11, 23, 22, 33, 22]</pre>                                                                                                                                                                                                                                                                                           |        |       |         |         |         |         |                      |      |                    |     |     |     |     |     |    |    |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|---------|---------|---------|---------|----------------------|------|--------------------|-----|-----|-----|-----|-----|----|----|
| 15                   | Write a pandas program to read marks detail of Manasvi and Calculate sum of all marks                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |       |         |         |         |         |                      |      |                    |     |     |     |     |     |    |    |
| 16                   | Write a Pandas program to sort the data frame first by 'Designation' in Ascending order, then by 'Name' in Descending order.                                                                                                                                                                                                                                                                                                                                                                                                               |        |       |         |         |         |         |                      |      |                    |     |     |     |     |     |    |    |
| 17                   | <p>Draw the histogram based on the Production of Wheat in different Years</p> <p>Year:2000,2002,2004,2006,2008,2010,2012,2014,2016,2018</p> <p>Production':4,6,7,15,24,2,19,5,16,4</p>                                                                                                                                                                                                                                                                                                                                                     |        |       |         |         |         |         |                      |      |                    |     |     |     |     |     |    |    |
| 18                   | Write a program to create a data frame for 3 students including name and roll numbers. and add new columns for 5 subjects and 1 column to calculate percentage. It should include random numbers in marks of all subjects                                                                                                                                                                                                                                                                                                                  |        |       |         |         |         |         |                      |      |                    |     |     |     |     |     |    |    |
| 19                   | <p>The table shows passenger car fuel rates in miles per gallon for several years. Make a LINE GRAPH of the data. During which 2-year period did the fuel rate decrease?</p> <p>YEAR:2000    2002    2004    2006</p> <p>RATE: 21.0    20.7    21.2    21.6</p>                                                                                                                                                                                                                                                                            |        |       |         |         |         |         |                      |      |                    |     |     |     |     |     |    |    |
| 20                   | <p>The number of bed-sheets manufactured by a factory during five consecutive weeks is given below.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Week</th> <th>First</th> <th>Second</th> <th>Third</th> <th>Fourth</th> <th>Fifth</th> </tr> </thead> <tbody> <tr> <td>Number of Bed-sheets</td> <td>600</td> <td>850</td> <td>700</td> <td>300</td> <td>900</td> </tr> </tbody> </table> <p>Draw the bar graph representing the above data</p>                                                 | Week   | First | Second  | Third   | Fourth  | Fifth   | Number of Bed-sheets | 600  | 850                | 700 | 300 | 900 |     |     |    |    |
| Week                 | First                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Second | Third | Fourth  | Fifth   |         |         |                      |      |                    |     |     |     |     |     |    |    |
| Number of Bed-sheets | 600                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 850    | 700   | 300     | 900     |         |         |                      |      |                    |     |     |     |     |     |    |    |
| 21                   | <p>The number of students in 7 different classes is given below. Represent this data on the bar graph.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Class</th> <th>6th</th> <th>7th</th> <th>8th</th> <th>9th</th> <th>10th</th> <th>11th</th> <th>12th</th> </tr> </thead> <tbody> <tr> <td>Number of Students</td> <td>130</td> <td>120</td> <td>135</td> <td>130</td> <td>150</td> <td>80</td> <td>75</td> </tr> </tbody> </table>                                                            | Class  | 6th   | 7th     | 8th     | 9th     | 10th    | 11th                 | 12th | Number of Students | 130 | 120 | 135 | 130 | 150 | 80 | 75 |
| Class                | 6th                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 7th    | 8th   | 9th     | 10th    | 11th    | 12th    |                      |      |                    |     |     |     |     |     |    |    |
| Number of Students   | 130                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 120    | 135   | 130     | 150     | 80      | 75      |                      |      |                    |     |     |     |     |     |    |    |
| 22                   | <p>The number of students in 7 different classes is given below. Represent this data on the bar graph.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Class</th> <th>6th</th> <th>7th</th> <th>8th</th> <th>9th</th> <th>10th</th> <th>11th</th> <th>12th</th> </tr> </thead> <tbody> <tr> <td>Number of Students</td> <td>130</td> <td>120</td> <td>135</td> <td>130</td> <td>150</td> <td>80</td> <td>75</td> </tr> </tbody> </table>                                                            | Class  | 6th   | 7th     | 8th     | 9th     | 10th    | 11th                 | 12th | Number of Students | 130 | 120 | 135 | 130 | 150 | 80 | 75 |
| Class                | 6th                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 7th    | 8th   | 9th     | 10th    | 11th    | 12th    |                      |      |                    |     |     |     |     |     |    |    |
| Number of Students   | 130                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 120    | 135   | 130     | 150     | 80      | 75      |                      |      |                    |     |     |     |     |     |    |    |
| 23                   | <p>An analysis has been done in the school to identify the hobby of students as given below.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Hobby</th> <th>Music</th> <th>Dance</th> <th>Games</th> <th>Reading</th> <th>Drawing</th> </tr> </thead> <tbody> <tr> <td>Number of Students</td> <td>130</td> <td>150</td> <td>180</td> <td>75</td> <td>160</td> </tr> </tbody> </table> <p>Represent this data on the Pie Chart. Slice colour must be pink, green, blue, gold and light sky blue</p> | Hobby  | Music | Dance   | Games   | Reading | Drawing | Number of Students   | 130  | 150                | 180 | 75  | 160 |     |     |    |    |
| Hobby                | Music                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Dance  | Games | Reading | Drawing |         |         |                      |      |                    |     |     |     |     |     |    |    |
| Number of Students   | 130                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 150    | 180   | 75      | 160     |         |         |                      |      |                    |     |     |     |     |     |    |    |

| 24                | <p>The Production(inTone)byFactory in Years is shown below Represent this data on the scatter graph.</p> <table border="1" data-bbox="284 174 1093 257"> <tr> <td>Year</td> <td>2000</td> <td>2005</td> <td>2010</td> <td>2015</td> </tr> <tr> <td>Production inTons</td> <td>50</td> <td>40</td> <td>30</td> <td>60</td> </tr> </table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Year      | 2000           | 2005          | 2010     | 2015          | Production inTons | 50     | 40        | 30   | 60         |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------------|---------------|----------|---------------|-------------------|--------|-----------|------|------------|-------|-----------|---------|-------|------------|-------|-------|----------|------|------------|-------|--------|-------|------|------------|-------|------------|-------|-------|------------|-------|-------|---------|---|---|-----|----------|------|----------------|-------|----------------|------|---|-------|----------|------|----|-------|----------------|------|---|-------|------------|-------|---|-------|----------------|------|---|-------|--------|-------|---|--|--|--|--|
| Year              | 2000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2005      | 2010           | 2015          |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| Production inTons | 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 40        | 30             | 60            |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| 25                | <p>Consider the Following set of Data 34,18,100,27,54,52,93,59,61,87,68,85,78,82,9 .Create a box plot and add title as Horizontal Box plot and y-axis title as “Value Range”</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |                |               |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| 26                | <p>Consider the table given below and write the query for the following<br/>Table:CLUB</p> <table border="1" data-bbox="375 627 1337 857"> <thead> <tr> <th>GCode</th> <th>GameName</th> <th>Number</th> <th>Fees</th> <th>Starting Date</th> </tr> </thead> <tbody> <tr> <td>101</td> <td>Carom</td> <td>2</td> <td>5000</td> <td>2004-01-23</td> </tr> <tr> <td>102</td> <td>Badminton</td> <td>2</td> <td>12000</td> <td>2003-12-12</td> </tr> <tr> <td>103</td> <td>Table</td> <td>4</td> <td>8000</td> <td>2004-02-14</td> </tr> <tr> <td>104</td> <td>Chess</td> <td>2</td> <td>9000</td> <td>2004-01-01</td> </tr> <tr> <td>105</td> <td>LawnTennis</td> <td>4</td> <td>25000</td> <td>2004-03-19</td> </tr> </tbody> </table> <ol style="list-style-type: none"> <li>1. To display the name of all games with theirGcodes.</li> <li>2. To display details of those games which are having Fees more than7000.</li> <li>3. To display the content of the CLUB table in descending order of start Date.</li> <li>4. To delete the record of all Game Names.</li> <li>5. List the minimum and maximum fees from CLUB.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | GCode     | GameName       | Number        | Fees     | Starting Date | 101               | Carom  | 2         | 5000 | 2004-01-23 | 102   | Badminton | 2       | 12000 | 2003-12-12 | 103   | Table | 4        | 8000 | 2004-02-14 | 104   | Chess  | 2     | 9000 | 2004-01-01 | 105   | LawnTennis | 4     | 25000 | 2004-03-19 |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| GCode             | GameName                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Number    | Fees           | Starting Date |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| 101               | Carom                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2         | 5000           | 2004-01-23    |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| 102               | Badminton                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 2         | 12000          | 2003-12-12    |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| 103               | Table                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4         | 8000           | 2004-02-14    |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| 104               | Chess                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2         | 9000           | 2004-01-01    |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| 105               | LawnTennis                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 4         | 25000          | 2004-03-19    |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| 27                | <p>Consider the tables <i>FLIGHTS</i> &amp; <i>FARES</i>. Write SQL commands for the statements</p> <p style="text-align: center;"><b>Table : FLIGHTS</b></p> <table border="1" data-bbox="427 1193 1305 1462"> <thead> <tr> <th>FNO</th> <th>SOURCE</th> <th>DEST</th> <th>NO_OF_FL</th> <th>NO_OF_STOP</th> </tr> </thead> <tbody> <tr> <td>IC301</td> <td>MUMBAI</td> <td>BANGALORE</td> <td>3</td> <td>2</td> </tr> <tr> <td>IC799</td> <td>BANGALORE</td> <td>KOLKATA</td> <td>8</td> <td>3</td> </tr> <tr> <td>MC101</td> <td>DELHI</td> <td>VARANASI</td> <td>6</td> <td>0</td> </tr> <tr> <td>IC302</td> <td>MUMBAI</td> <td>KOCHI</td> <td>1</td> <td>4</td> </tr> <tr> <td>AM812</td> <td>LUCKNOW</td> <td>DELHI</td> <td>4</td> <td>0</td> </tr> <tr> <td>MU499</td> <td>DELHI</td> <td>CHENNAI</td> <td>3</td> <td>3</td> </tr> </tbody> </table> <p style="text-align: center;"><b>Table : FARES</b></p> <table border="1" data-bbox="459 1529 1273 1836"> <thead> <tr> <th>FNO</th> <th>AIRLINES</th> <th>FARE</th> <th>TAX_percentage</th> </tr> </thead> <tbody> <tr> <td>IC301</td> <td>IndianAirlines</td> <td>9425</td> <td>5</td> </tr> <tr> <td>IC799</td> <td>SpiceJet</td> <td>8846</td> <td>10</td> </tr> <tr> <td>MC101</td> <td>DeccanAirlines</td> <td>4210</td> <td>7</td> </tr> <tr> <td>IC302</td> <td>JetAirways</td> <td>13894</td> <td>5</td> </tr> <tr> <td>AM812</td> <td>IndianAirlines</td> <td>4500</td> <td>6</td> </tr> <tr> <td>MU499</td> <td>Sahara</td> <td>12000</td> <td>4</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <ol style="list-style-type: none"> <li>i) Display flight number &amp; number of flights from Mumbai from the table flights.</li> <li>ii) Arrange the contents of the table flights in the descending order of destination.</li> <li>iii) Increase the tax by 2% for the flights starting from Delhi.</li> <li>iv) Display the flight number and fare to be paid for the flights from Mumbai to Kochiusing</li> </ol> | FNO       | SOURCE         | DEST          | NO_OF_FL | NO_OF_STOP    | IC301             | MUMBAI | BANGALORE | 3    | 2          | IC799 | BANGALORE | KOLKATA | 8     | 3          | MC101 | DELHI | VARANASI | 6    | 0          | IC302 | MUMBAI | KOCHI | 1    | 4          | AM812 | LUCKNOW    | DELHI | 4     | 0          | MU499 | DELHI | CHENNAI | 3 | 3 | FNO | AIRLINES | FARE | TAX_percentage | IC301 | IndianAirlines | 9425 | 5 | IC799 | SpiceJet | 8846 | 10 | MC101 | DeccanAirlines | 4210 | 7 | IC302 | JetAirways | 13894 | 5 | AM812 | IndianAirlines | 4500 | 6 | MU499 | Sahara | 12000 | 4 |  |  |  |  |
| FNO               | SOURCE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | DEST      | NO_OF_FL       | NO_OF_STOP    |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| IC301             | MUMBAI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | BANGALORE | 3              | 2             |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| IC799             | BANGALORE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | KOLKATA   | 8              | 3             |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| MC101             | DELHI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | VARANASI  | 6              | 0             |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| IC302             | MUMBAI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | KOCHI     | 1              | 4             |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| AM812             | LUCKNOW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | DELHI     | 4              | 0             |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| MU499             | DELHI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | CHENNAI   | 3              | 3             |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| FNO               | AIRLINES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | FARE      | TAX_percentage |               |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| IC301             | IndianAirlines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 9425      | 5              |               |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| IC799             | SpiceJet                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 8846      | 10             |               |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| MC101             | DeccanAirlines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 4210      | 7              |               |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| IC302             | JetAirways                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 13894     | 5              |               |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| AM812             | IndianAirlines                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 4500      | 6              |               |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
| MU499             | Sahara                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 12000     | 4              |               |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |
|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |                |               |          |               |                   |        |           |      |            |       |           |         |       |            |       |       |          |      |            |       |        |       |      |            |       |            |       |       |            |       |       |         |   |   |     |          |      |                |       |                |      |   |       |          |      |    |       |                |      |   |       |            |       |   |       |                |      |   |       |        |       |   |  |  |  |  |

the tables, Flights & Fares, where the fare to be paid =fare+fare\*tax/100.

v) Display total no of source stations(eliminate duplicate) present in the table.

vi) Display the fare for the flight for MUMBAI toBANGLORE

vii) Display the records of source stations started with letter‘B’.

viii) Display the flight no. for which fare to be paid is less than 3000.

ix) Display total no. of flights available for each Airlines

x) Add a new column Dep\_Time in the table Flight.

xi) Delete the record of flight no. IC301 from the table FARE.

xii) increase the size ofthe column ‘source’ to 30 in the Table FLIGHT

28

Consider the following tables Employee and salary. Write SQL commands for the statements to(iv)

**Table : Employee**

| Eid | Name          | Deptid | Qualification | Sex |
|-----|---------------|--------|---------------|-----|
| 1   | Deepali Gupta | 101    | MCA           | F   |
| 2   | Rajat Tyagi   | 101    | BCA           | M   |
| 3   | Hari Mohan    | 102    | B.A           | M   |
| 4   | Harry         | 102    | M.A           | M   |
| 5   | Sumit Mittal  | 103    | B.Tech        | M   |
| 6   | Jyoti         | 101    | M.Tech        | F   |

**Table : Salary**

| Eid | Basic | DA   | HRA  | Bonus |
|-----|-------|------|------|-------|
| 1   | 6000  | 2000 | 2300 | 200   |
| 2   | 2000  | 300  | 300  | 30    |
| 3   | 1000  | 300  | 300  | 40    |
| 4   | 1500  | 390  | 490  | 30    |
| 5   | 8000  | 900  | 900  | 80    |
| 6   | 10000 | 300  | 490  | 89    |

- (i) To display the frequency of employees department wise.
- (ii) To list the names of those employees only whose name starts with ‘H’
- (iii) To add a new column insalary table.the column name is total\_sal.
- (iv) To store the corresponding value sin the total\_salcolumn.

29. Observe the following tables and write the querieson the basis the given tables:- Table:hospital

|    | Name    | Age | Department       | Charges | Gender |
|----|---------|-----|------------------|---------|--------|
| 1  | Arprit  | 62  | Surgery          | 300     | M      |
| 2  | Zarina  | 22  | ENT              | 250     | F      |
| 3  | Kareem  | 32  | Orthopaedic      | 200     | M      |
| 4  | Arun    | 12  | Surgery          | 300     | M      |
| 5  | Zubin   | 30  | ENT              | 250     | M      |
| 6  | Kettaki | 16  | ENT              | 250     | F      |
| 7  | Ankita  | 29  | Cardiology       | 800     | F      |
| 8  | Zareen  | 45  | Gynecology       | 300     | F      |
| 9  | Kush    | 19  | Cardiology       | 800     | M      |
| 10 | Shilpa  | 23  | Nuclear Medicine | 400     | F      |

Write MySql command for the following:

- a) Tdisplaye Totalno.of employees present in the Hospital

- b) To display all information about the patients of cardiology department.  
 c) To list the name of female patients who are in ENT department.  
 To display name and gender of all the patients whose age is in the range of 40 to 50 in ascending order of the irname.

29 consider the following tables SCHOOL and ADMIN. Write SQL commands for the statements(i) to (iv)).**SCHOOL**

| CODE | TEACHERNAME | SUBJECT   | DOJ        | PERIODS | EXPERIENCE |
|------|-------------|-----------|------------|---------|------------|
| 1001 | RAVISHANKAR | ENGLISH   | 12/03/2000 | 24      | 10         |
| 1009 | PRIYARAI    | PHYSICS   | 03/09/1998 | 26      | 12         |
| 1203 | LISAANAND   | ENGLISH   | 09/04/2000 | 27      | 5          |
| 1045 | YASHRAJ     | MATHS     | 24/08/2000 | 24      | 15         |
| 1123 | GANAN       | PHYSICS   | 16/07/1999 | 28      | 3          |
| 1167 | HARISHB     | CHEMISTRY | 19/10/1999 | 27      | 5          |
| 1215 | UMESH       | PHYSICS   | 11/05/1998 | 22      | 16         |

**ADMIN**

| CODE | GENDER | DESIGNATION    |
|------|--------|----------------|
| 1001 | MALE   | VICEPRINCIPAL  |
| 1009 | FEMALE | COORDINATOR    |
| 1203 | FEMALE | COORDINATOR    |
| 1045 | MALE   | HOD            |
| 1123 | MALE   | SENIOR TEACHER |
| 1167 | MALE   | SENIOR TEACHER |
| 1215 | MALE   | HOD            |

- i) To display TEACHERNAME,PERIODS of all teachers whose periods less than 25.  
 ii) To display TEACHERNAME, CODE and DESIGNATION from tables SCHOOL and ADMIN whose gender is male.  
 iii) To display the number of teachers in each subject.

To display CODE,TEACHERNAMEandSUBJECTof all teachers who have joined the school after 01/01/1999.

**30, Design a Django Based Application to obtain a search criteria and fetches record based on that from BooksTable.**

**31. Design a Django based application that fetches all records from student table of School database.**

**32. Design a Django based application that fetches all records of those employees who are 'Salesman'**



## Examination Tips

1. You must compulsorily know the chapters to be covered and the weightage for each chapter.
2. Know the Question paper pattern along with weightage for various types of questions viz. VSA, SA, LA type questions.
3. Learn the definitions by understanding the concepts well.
4. The problem must be analysed and can be remembered by regular practice of writing over and again. Writing once is said to be equivalent to reading 13 times! Make your own notes in simple language in a way you can understand and remember.
5. You can discuss/teach what you have learnt with /to the peer group. This practice makes the memory deeper since it demands for effective recalling of knowledge. The more you share, the more you remember.
6. Have a time table for self-study at home. More time is to be allotted for the subjects which require deep and concentrated study. Certain subjects have to be studied daily while a few require only 2-3 days in a week. Combination of tough and easy subjects in a day will keep you away from getting bored or tired.
7. Write important commands and syntax and display them in your study room in prominent places . Make a habit of glancing at them whenever possible.
8. As far as possible, you can get into the habit of going early to bed and study in early hours of the day because the mind is very fresh after a good sleep. Studying for one hour in the early morning is equivalent to 4 hours of late night study.
9. Fast and legible handwriting is essential for exam. You need not worry about beauty of your handwriting at this stage but it must be legible enough for the examiners to read and understand what you write. This can be mastered only when practiced through the year.
10. Write as many dummy tests/exams as possible at home apart from the ones administered in the school.
11. You can write and practice chapter-wise tests with a schedule of one subject in a day.
12. Indentation should be maintained in case of block programming.
13. You should know and restrict to the word-limit of VSA/SA/LA type questions .Otherwise you may tend to write too much for VSA and very little for LA type questions. (Answer management) Try to write the known answers as fast as possible and save time for other answers to think recollect and write.

**“The secret to getting ahead is getting started”**

**SET-4****Series BVM****Code No. 90**

Roll No.

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Candidates must write the Code on the title page of the answer-book.

- Please check that this question paper contains **11** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains **7** questions.
- **Please write down the Serial Number of the question before attempting it.**
- 15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the students will read the question paper only and will not write any answer on the answer-book during this period.

## INFORMATICS PRACTICES

*Time allowed : 3 hours**Maximum Marks : 70*

### **Instructions :**

- All questions are compulsory.*
- Answer the questions after carefully reading the text.*
- Q. 2 and Q.4 have to be answered with respect to Java Language.*
- Q.3, Q.5 and Q.6 have to be answered with respect to MySQL.*



1. (a) Write the functions of the following pieces of network hardware : 2
- (i) Modem
  - (ii) Switch
- (b) Write two ways used to make sure that the data is secure and is available only to the intended and authorized persons in a network. 2
- (c) Expand TCP/IP. Write the purpose of TCP/IP in communication of data on a network. 2
- (d) Expand the following terms : 2
- (i) MAC Address
  - (ii) ODF
- (e) Explain in brief any one freedom offered by Open Source Software. Write one example for each of the following : 2
- (i) An Open Source Operating System
  - (ii) An Open Source Office Suite
2. (a) Write the data type of variables that should be used to store the following in Java : 1
- (i) Sales amount (of Sales) achieved by a Sales Person
  - (ii) Roll Number of Student
- (b) Distinguish between `isSelected()` and `setSelected()` methods of Java with the help of example. 1
- (c) What will be displayed in `jTextField1` and `jTextField2` when the following code is executed ? 2
- ```
int x,y,z,t;  
x = 3;  
y = 8;  
z = x+y/8;  
t = z++;  
jTextField1.setText(""+z);  
jTextField2.setText(""+t);
```

**OR**



What will be displayed in jTextField1 and jTextField2 when the following code is executed ?

```
int x,y,z,t;
t = 3;
z = 0;
do
{
    z = z+1;
}
while (t>3);
jTextField1.setText(""+z);
jTextField2.setText(""+t);
```

- (d) The following HTML code has error(s). Rewrite the correct code underlining corrections made. 2

```
<ol type="A" begin="4">
    <li>List item 1</li>
    <li>List item 2</li>
    <li>List item 3</li>
</end>
```

**OR**

Expand XML. For what purpose is XML used ?

- (e) Write the output that will be displayed on jLabel1 and jLabel2. 2

```
String a,b,c,d,x;
a= "Keep";
b="your";
c="surroundings";
d="clean";
int e = b.length()/4+d.length()*2;
x=b+c+d;
x=a.concat(x);
jLabel1.setText("The value of e = "+e);
jLabel2.setText(x.toUpperCase());
```



- (f) Write the output displayed in jTextField1 and jTextField2 when the following code is executed :

2

```
char code;
int z;
z = 0;
code = 'w';

    switch (code)
    {
        case 'w' : z = z+1;
        case 'r' : z = z+2;
                    break;
        case 's' : z=z +3;
                    break;
        default : z = z+4;
    }
jTextField1.setText(""+z);
jTextField2.setText(""+code);
```

**OR**

What happens if break statement is omitted with a case in a switch statement ?

3. (a) In CHAR(10) and VARCHAR(10), what does the number 10 indicate ?

1

- (b) 'Employee' table has a column named 'CITY' that stores city in which each employee resides. Write SQL query to display details of all rows except those rows that have CITY as 'DELHI' or 'MUMBAI' or 'CHANDIGARH'.

1



(c) Consider the following table :

**Table : RESULTS**

STUDENTID	NAME	EXAMID	SCORE
10	Leena	1	20
10	Leena	2	25
11	Samarth	1	30
11	Samarth	2	35
12	Jai	1	14
12	Jai	2	15
14	Shoaib	1	30
14	Shoaib	2	12

Abhay wants to know the number of students who took the test. He writes the following SQL statement to count STUDENTID without duplicates. However the statement is not correct. Rewrite the correct statement.

2

```
SELECT DISTINCT (COUNT STUDENTID) FROM RESULTS;
```

(d) Aman has used the following SQL command to create a table 'stu' :

```
CREATE TABLE stu  
(  
    id INTEGER,  
    name VARCHAR(100)  
);
```

Then, Aman enters the following SQL statements to enter 4 rows :

```
INSERT INTO stu VALUES (1, "abc");  
INSERT INTO stu VALUES (2, "abc");  
INSERT INTO stu VALUES (3, "bcd");
```

Write the output that will be produced by the following SQL statement :

2

```
SELECT name, Count(*)  
FROM stu  
GROUP BY name;
```



- (e) Write SQL statement to add a column "COUNTRY" with data type and size as VARCHAR(70) to the existing table named "PLAYER".  
Is it a DDL or DML or TCL command ? 2
- (f) Table Student has the columns RNO and SCORE. It has 3 rows in it. Following two SQL statements were entered that produced the output (AVG(SCORE) as 45 and COUNT(SCORE) as 2) : 2

(i) `AVG (SCORE)`

(ii) `COUNT (SCORE)`

Data in SCORE column is same in two rows. What data is present in the SCORE column in the three rows ?

4. (a) What will displayed in jTextField1 when the following code is executed ? 1

```
int x=3, y=6, z=0;
    if(x>3)
        z = z + 1;
    if((x<4) && (y>6))
        z = z + 2;
    if(x>2 && y>=6)
        z = z + 3;
    if((x<3) || (y>6))
        z = z + 4;
jTtxtField1.setText(""+z);
```

- (b) Rewrite the following code after correcting errors. Underline the corrections made. 2

```
int a, c;
30 = c;
4 = a;
while do (c>10)
{
    a = = a + c;
    c = c-5;
}
```



(c) How many times will the following loop execute ?

2

```
int K = 7;
int I = -2;
do
{
    I=I+2;
    K=K-1;
}
while (I <= K);
```

**OR**

How many times will the following loop execute ?

```
for (i = 2; i <=5;i++)
{
    z = i;
}
```

(d) Write the output in jTextField1 when the following code is executed : 2

```
int k, n, sum = 0;
for (k = 2; k <=5; k++)
{
    n = k - 2 * 3;
    sum = sum + n;
}
jTextField1.setText(""+sum);
```

**OR**

Write the output in jTextField1 when the following code is executed :

```
int k, n =0, sum = 0;
k = 2;
while (k<=5)
{
    n = k +4;
    sum = sum + n;
    k=k+2;
}
jTextField1.setText(""+n);
```





(e) Write the values of i and k after execution of the following code : 2

```
int i,j,k;
i = 2;
j = 8;
k = 6;
do
{
    i = i + 4;
    k = k + i;
}
while (i < j);
```

(f) Ms. Supriya works as a programmer in a courier company, “ABC Packaging and Shipping Service” where she has designed a software to compute charges to be paid by the customers.

- Weight (in grams) of the parcel is entered by the user.
- Any one Category of parcel out of A/B/C is chosen by the user.
- Based on the Category selected, Transportation Charges (per gram) are computed according to the following criterion :

Category	Transportation Charges Per gram
A	₹ 2.00
B	₹ 3.00
C	₹ 5.00

- Insurance Charges is a flat ₹ 80.00 per parcel.
- **Total Transportation Charges = Transportation Charges Per gram \* Weight in grams (of parcel) entered by the user.**
- **Total Charges = Total Transportation Charges + Insurance Charges.**

Help Ms. Priya in writing the code to do the following :

- (i) When **Calculate Charges** button is clicked, **Insurance Charges, Transportation Charges per gram, Total Transportation Charges** and **Total Charges** should be calculated and displayed in the respective text fields. 4
- (ii) When **'CLEAR'** button is clicked, all the textfields and radiobuttons should be cleared. 1
- (iii) When **'Exit'** button is clicked, the application should close. 1



5. Consider the following table 'Transporter' that stores the order details about items to be transported. Write SQL commands for the statements (i) to (viii) and write output for SQL queries (ix) and (x).

**Table : TRANSPORTER**

ORDERNO	DRIVERNAME	DRIVERGRADE	ITEM	TRAVELDATE	DESTINATION
10012	RAM YADAV	A	TELEVISION	2019-04-19	MUMBAI
10014	SOMNATH SINGH		FURNITURE	2019-01-12	PUNE
10016	MOHAN VERMA	B	WASHING MACHINE	2019-06-06	LUCKNOW
10018	RISHI SINGH	A	REFRIGERATOR	2019-04-07	MUMBAI
10019	RADHE MOHAN		TELEVISION	2019-05-30	UDAIPUR
10020	BISHEN PRATAP	B	REFRIGERATOR	2019-05-02	MUMBAI
10021	RAM		TELEVISION	2019-05-03	PUNE

- (i) To display names of drivers and destination city where TELEVISION is being transported. 1
- (ii) To display driver names and destinations where destination is not MUMBAI. 1
- (iii) To display the names of destination cities where items are being transported. There should be no duplicate values. 1
- (iv) To display details of rows that have some value in DRIVERGRADE column. 1
- (v) To display names of drivers, names of items and travel dates for those items that are being transported on or before 1<sup>st</sup> April 2019. 1
- (vi) To display the number of drivers who have 'MOHAN' anywhere in their names. 1
- (vii) To display the names of drivers, item names and travel dates in alphabetic (ascending) order of driver names. 1
- (viii) To display names of drivers whose names are three characters long. 1
- (ix) **SELECT ITEM, COUNT(\*) FROM TRANSPORTER  
GROUP BY ITEM  
HAVING COUNT(\*) >1;** 1
- (x) **SELECT MAX(TRAVELDATE) FROM TRANSPORTER WHERE  
DRIVERGRADE = 'A';** 1



6. (a) Mr. Sen has to create a table named 'Employee' with Columns to store EmpID, Name, Designation, Age and Salary. EmpID is the Primary key and Name cannot be NULL.

Some of the rows that will be inserted are shown below.

101	Smita Kumar	Secretary	28	39500.00
102	Mani Scott	Programmer	32	45300.00
103	Firdaus Ali	Programmer II	45	67500.00

Write SQL query to create the above table with appropriate data types and sizes of columns.

2

**OR**

Ms. Rajshri is the Class Teacher of Class XII. She wants to create a table named 'Student' to store marks in different subjects of her class. Identify any 4 columns for the table along with their suitable data types.

- (b) Consider the following tables **PARTICIPANT** and **ACTIVITY** and answer the questions that follow :

**Table : PARTICIPANT**

ADMNO	NAME	HOUSE	ACTIVITYCODE
6473	Kapil Shah	Gandhi	A105
7134	Joy Mathew	Bose	A101
8786	Saba Arora	Gandhi	A102
6477	Kapil Shah	Bose	A101
7658	Faizal Ahmed	Bhagat	A104

**Table : ACTIVITY**

ACTIVITYCODE	ACTIVITYNAME	POINTS
A101	Running	200
A102	Hopping bag	300
A103	Skipping	200
A104	Bean bag	250
A105	Obstacle	350

When the table "PARTICIPANT" was first created, the column 'NAME' was planned as the Primary key by the Programmer. Later a field ADMNO had to be set up as Primary key. Explain the reason.

2

**OR**

Identify data type and size to be used for column ACTIVITYCODE in table ACTIVITY.



(c) With reference to the above given tables (in Q6 b), write commands in **SQL** for (i) to (iii).

(i) To display Activity Code along with number of participants participating in each activity (Activity Code wise) from the table Participant. 2

**OR**

How many rows will be there in Cartesian product of the two tables in consideration here ?

(ii) To display Names of Participants, Activity Code, Activity Name in alphabetic ascending order of names of participants. 2

(iii) To display Names of Participants along with Activity Codes and Activity Names for only those participants who are taking part in Activities that have 'bag' in their Activity Names and Points of activity are above 250. 2

7. (a) How does e-governance help in increasing Accountability (answerability of the Government to the people) ? Write 2 points. 2

(b) Write 2 precautions to be followed while doing Online shopping. 1

(c) Ms. Deepika of ABC School is creating a form for a Summer Camp application. Help her to choose the most appropriate controls from ListBox, ComboBox, TextField, TextArea, RadioButton, CheckBox, Label and Command Button for the following entries : 2

S.No.	Function
1.	Let the user enter <b>NAME</b> of student
2.	Let the user enter <b>MOBILE NUMBER</b> of student
3.	Let the user choose one <b>TSHIRT</b> size out of the categories : XL / L / M / S
4.	Let the user select Activities out of Rock Climbing/ Mountain Biking/Zip Lining/Night Hike. More than one activity may be chosen.



तत् त्वं पूषन् अपावृणु  
केन्द्रीय विद्यालय संगठन

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