

**CLASS XII**  
**INFORMATICS PRACTICES**  
**PRACTICAL LIST**

- 1 Write a NumPy program to create a 3x3 matrix with values ranging from 2 to 10**

```
import numpy as np
x = np.arange(2, 11).reshape(3,3)
print(x)
```

- 2 Write a NumPy program to generate six random integers between 25 and 55.**

```
import numpy as np
x = np.random.randint(low=25, high=55, size=6)
print(x)
```

- 3 Write a Pandas program to convert a Panda module Series to Python list and it's type**

```
import pandas as pd
ds = pd.Series([2, 4, 6, 8, 10])
print("Pandas Series and type")
print(ds)
print(type(ds))
print("Convert Pandas Series to Python list")
print(ds.tolist())
print(type(ds.tolist()))
```

- 4 Write a Pandas program to compare the elements of the two Pandas Series??**

```
import pandas as pd
ds1 = pd.Series([2, 4, 6, 8, 10])
ds2 = pd.Series([1, 3, 5, 7, 10])
print("Series1:")
print(ds1)
print("Series2:")
print(ds2)
print("Compare the elements of the said Series:")
print("Equals:")
print(ds1 == ds2)
print("Greater than:")
print(ds1 > ds2)
print("Less than:")
print(ds1 < ds2)
```

- 5 Write a Python program to convert a dictionary to a Pandas series. Sample Series:**

**Dictionary:**

**{'a': 100, 'b': 200, 'c': 300, 'd': 400, 'e': 800}**

**Converted series:**

**a 100**

**b 200**

```
c 300
d 400
e 800
dtype: int64
```

```
import pandas as pd
d1 = {'a': 100, 'b': 200, 'c':300, 'd':400, 'e':800}
print("Dictionary:")
print(d1)
s1 = pd.Series(d1)
print("Converted series:")
print(s1)
```

**6 Write a Pandas program to add, subtract, multiple and divide two Pandas Series**

```
import pandas as pd
ds1 = pd.Series([2, 4, 6, 8, 10])
ds2 = pd.Series([1, 3, 5, 7, 9])
ds = ds1 + ds2
print("Add two Series:")
print(ds)
print("Subtract two Series:")
ds = ds1 - ds2
print(ds)
print("Multiply two Series:")
ds = ds1 * ds2
print(ds)
print("Divide Series1 by Series2:")
ds = ds1 / ds2
print(ds)
```

**7 Write a program to sort the element of Series S1 into S2**

```
import pandas as pd
s1 = pd.Series(['100', '200', 'python', '300.12', '400'])
print("Series before sorting:")
print(s)
s2 = pd.Series(s1).sort_values()
print("Series After sorting:")
print(s2)
```

**8 Write a NumPy program to reverse an array Ar**

```
import numpy as np
Ar= np.arange(12,45,13,45,56,38)
print("Original Array:")
print(Ar)
print("Reverse array:")
Ar = Ar[::-1]
print(Ar)
```

- 9 **Write a NumPy program to create a 8x8 matrix and fill it with a checkerboard pattern.**

**Checkerboard pattern:**

```
[[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]]
```

```
import numpy as np
x = np.ones((3,3))
print("Checkerboard pattern:")
x = np.zeros((8,8),dtype=int)
x[1::2,::2] = 1
x[:,1::2] = 1
print(x)
```

- 10 **Write a NumPy program to append values to the end of an array. Expected Output:**

**Original array:**

**[10, 20, 30]**

**After append values to the end of the array:**

**[10 20 30 40 50 60 70 80 90]**

```
import numpy as np
x = [10, 20, 30]
print("Original array:")
print(x)
x = np.append(x, [40, 50, 60,70, 80, 90])
print("After append values to the end of the array:")
print(x)
```

- 11 **Write a NumPy program to test whether each element of a 1-D array is also present in a second array**

```
import numpy as np
ar1 = np.array([0, 12, 22, 40, 67])
print("Array1: ",ar1)
ar2 = [0, 22]
print("Array2: ",ar2)
print("Compare each element of array1 and array2")
print(np.in1d(array1, array2))
```

- 12 **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**

```
import numpy as np
x = np.array([1,2,3], dtype=np.float64)
print("Size of the array: ", x.size)
print("Length of one array element in bytes: ", x.itemsize)
print("Total bytes consumed by the elements of the array: ",
x.nbytes)
```

- 13 **Write a Pandas program to select the rows where the height is not known, i.e. is NaN.**  
**'name': ['Asha', 'Radha', 'Kamal', 'Divy', 'Anjali'],**  
**'height': [ 5.5, 5, np.nan, 5.9, np.nan],**  
**'age': [11, 23, 22, 33, 22]**

```
import pandas as pd
import numpy as np
pers_data = {'name': ['Asha', 'Radha', 'Kamal', 'Divy',
                    'Anjali'],
            'height': [ 5.5, 5, np.nan, 5.9, np.nan],
            'age': [11, 23, 22, 33, 22]}
```

```
labels = ['a', 'b', 'c', 'd', 'e']
```

```
df = pd.DataFrame(pers_data, index=labels)
print("Persons whose height not known:")
print(df[df['height'].isnull()])
```

- 14 **Write a Pandas program to select the name of persons whose height is between 5 to 5.5 (both values inclusive)**  
**'name': ['Asha', 'Radha', 'Kamal', 'Divy', 'Anjali'],**  
**'height': [ 5.5, 5, np.nan, 5.9, np.nan],**  
**'age': [11, 23, 22, 33, 22]**

```
import pandas as pd
import numpy as np
pers_data = {'name': ['Asha', 'Radha', 'Kamal', 'Divy',
                    'Anjali'],
            'height': [ 5.5, 5, np.nan, 5.9, np.nan],
            'age': [11, 23, 22, 33, 22]}
```

```
labels = ['a', 'b', 'c', 'd', 'e']
df = pd.DataFrame(pers_data, index=labels)
print("Persons whose height is between 5 and 5.5")
print(df[(df['height']>= 5 )& (df['height']<= 5.5)])
```

- 15 **Write a panda program to read marks detail of Manasvi and Calculate sum of all marks**

```
import pandas as pd
import numpy as np
data = {'Manasvi': ['Physics', 'Chemistry', 'English',
                  'Maths', 'Computer Sc'],
       'marks': [ 89,99,97,99,98],}
```

```
df = pd.DataFrame(data )
print("Sum of Marks:")
print(df['marks'].sum())
```

- 16 **Write a Pandas program to sort the data frame first by 'Designation' in Ascending order, then by 'Name' in Descending order.**

```
import pandas as pd
```

```
data1 = {'Name':['Akshat', 'Sameer', 'Pihu', 'Neha'],
'Age':[28,34,29,42], 'Designation':['Accountant', 'Clerk',
'Clerk', 'Manager']}
df1 = pd.DataFrame(data1)
print (df1.sort_values(by=['Designation','Name'],
ascending=[True,False]))
```

- 17 Draw the histogram based on the Production of Wheat in different Years  
Year:2000,2002,2004,2006,2008,2010,2012,2014,2016,2018  
Production':4,6,7,15,24,2,19,5,16,4**

```
import pandas as pd
import matplotlib.pyplot as plt
data={'Year':[2000,2002,2004,2006,2008,2010,2012,2014,2016,2018],\
'Production':[4,6,7,15,24,2,19,5,16,4]}
d=pd.DataFrame(data)
print(d)
x=d.hist(column='Production',bins=5,grid=True)
plt.show(x)
```

- 18 Write a program to create dataframe for 3 student 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**

```
import pandas as pd, numpy as np, random
D={'Roll':[1,2,3], 'Name':['Sangeeta','Shanti','Swati']}
P=[]
C=[]
M=[]
E=[]
H=[]
SD=pd.DataFrame(D)
for i in range(3):
P.append(random.randint(1,101))
C.append(random.randint(1,101))
M.append(random.randint(1,101))
E.append(random.randint(1,101))
H.append(random.randint(1,101))
SD['Phy']=P
SD['Chem']=C
SD['Maths']=M
SD['Eng']=E
SD['Hin']=H
SD['Total']=SD.Phys+SD.Chem+SD.Maths+SD.Eng+SD.Hin
SD['Per']=SD.Total/5
print(SD)
```

- 19 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?**

**YEAR: 2000 2002 2004 2006  
RATE: 21.0 20.7 21.2 21.6**

```
import matplotlib.pyplot as p
Yr=[2000,2002,2004,2006]
rate=[21.0,20.7,21.2,21.6]
p.plot(Yr,rate)
p.show()
```

- 20 The number of bed-sheets manufactured by a factory during five consecutive weeks is given below.

Week	First	Second	Third	Fourth	Fifth
Number of Bed-sheets	600	850	700	300	900

Draw the bar graph representing the above data

```
import matplotlib.pyplot as p

x=['First', 'Second', 'Third', 'Fourth', 'Fifth'] # Assigning Data for X axis
y=[600,850,700,300,900] # Assigning Data for Y axis

p.title('Production By Factory')
p.xlabel('Week')
p.ylabel('NO. of Bed Sheets')
p.bar(x,y,color='Blue',width=.50) # To draw bar graph, with each bar of .50 width
p.show()
```

- 21 The number of students in 7 different classes is given below. Represent this data on the bar graph.

Class	6th	7th	8th	9th	10th	11th	12th
Number of Students	130	120	135	130	150	80	75

```
import matplotlib.pyplot as p

x=[6,7,8,9,10,11,12] # Assigning Data for X axis
y=[130,120,135,130,150,80,75] # Assigning Data for Y axis

p.title('Class Strength')
p.xlabel('CLASS')
p.ylabel('NO. of Students')
p.bar(x,y,color='green',width=.40) # To draw bar graph, with each bar of .40 width
p.show()
```

- 22 The number of students in 7 different classes is given below. Represent this data on the bar graph.

Class	6th	7th	8th	9th	10th	11th	12th
Number of Students	130	120	135	130	150	80	75

```
import matplotlib.pyplot as p

x=[6,7,8,9,10,11,12] # Assigning Data for X axis
y=[130,120,135,130,150,80,75] # Assingning Data for Y axis

p.title('Class Strength')
p.xlabel('CLASS')
p.ylabel('NO. of Students')
p.bar(x,y,color='green',width=.40) # To draw bar graph, with each bar of .40 width
p.show()
```

23 An analysis has been done in the school to identify hobby of Students as given below.

Hobby	Music	Dance	Games	Reading	Drawing
Number of Students	130	150	180	75	160

Represent this data on the Pie Chart . Slice colour must be pink,green,blue,gold and light sky blue

```
import matplotlib.pyplot as p
L=["Drawing","Music","Dance","Games","Reading"] # Defining labels
nos=[130,150,180,75,160] # Assingning Data for pie
c=["pink","green","blue","gold","lightskyblue"]
expld= ( 0.1,0,0,0,0)
p.figure ( figsize=[8,5])
p.title ( 'Hobbies Analysis')
p.pie ( nos,explode=explode,labels=L,colors=c,autopct='% .2f%%' ,shadow=True,startangle=170)
p.show ()
```

24 The Production(in Tons) by Factory in Years is shown below Represent this data on the scatter graph.

Year	2000	2005	2010	2015
Production in Tons	50	40	30	60

```
import matplotlib.pyplot as p
y=[50,40,30,60] # Assingning Data for Y axis
x=[2000,2005,2010,2015] # Assingning Data for X axis
p.title('Production By Factory')
p.grid(True)
p.ylabel('Production of Iron in Tons')
p.xlabel('Year')
p.scatter(x,y,color='b') # To draw SCATTER graph WITH BLUE DOTS
p.show()
```

25 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 Boxplot and y-axis title as "Value Range"

```
import matplotlib.pyplot as plt
D=[34,18,100,27,54,52,93,59,61,87,68,85,78,82,9]
plt.boxplot(D,vert=False,showmeans=True)
plt.title("Horizontal Boxplot")
plt.xlabel("value Range")
plt.show()
```

26

Consider the table given below and write the query for the following  
Table: CLUB

GCode	GameName	Number	Fees	StartingDate
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	Lawn Tennis	4	25000	2004-03-19

1. To display the name of all games with their Gcodes.
2. To display details of those games which are having Fees more than 7000.
3. To display the content of the CLUB table in descending order of startDate.
4. To delete the record of all GameNames.
5. List the minimum and maximum fees from CLUB.

27

Consider the tables *FLIGHTS* & *FARES*. Write SQL commands for the statements

Table : FLIGHTS

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

Table : FARES

FNO	AIRLINES	FARE	TAX_percentage
IC301	Indian Airlines	9425	5
IC799	Spice Jet	8846	10
MC101	Deccan Airlines	4210	7
IC302	Jet Airways	13894	5
AM812	Indian Airlines	4500	6
MU499	Sahara	12000	4

- i) Display flight number & number of flights from Mumbai from the table flights.
- ii) Arrange the contents of the table flights in the descending order of destination.
- iii) Increase the tax by 2% for the flights starting from Delhi.
- iv) Display the flight number and fare to be paid for the flights from Mumbai to Kochi using 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 to BANGALORE
- 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 of the column 'source' to 30 in the Table FLIGHT



28

Consider the following tables Employee and salary. Write SQL commands for the statements (i) 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 in salary table . the column name is total\_sal.
- (iv) To store the corresponding values in the total\_sal column.

29. Observe the following tables and write the queries on 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) To display Total no. 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 their name.

Consider the following tables SCHOOL and ADMIN. Write SQL commands for the statements (i) to (iv)).

**SCHOOL**

CODE	TEACHERNAME	SUBJECT	DOJ	PERIODS	EXPERIENCE
1001	RAVI SHANKAR	ENGLISH	12/03/2000	24	10
1009	PRIYA RAI	PHYSICS	03/09/1998	26	12
1203	LISA ANAND	ENGLISH	09/04/2000	27	5
1045	YASHRAJ	MATHS	24/08/2000	24	15
1123	GANAN	PHYSICS	16/07/1999	28	3
1167	HARISH B	CHEMISTRY	19/10/1999	27	5
1215	UMESH	PHYSICS	11/05/1998	22	16

**ADMIN**

CODE	GENDER	DESIGNATION
1001	MALE	VICE PRINCIPAL
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.
- iv) To display CODE, TEACHERNAME and SUBJECT of 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 Books Table.**

**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'**