# STUDENT SUPPORT MATERIAL

तत् त्वं पूषन् अपावृणु

केन्द्रीय विद्यालय संगठन

Session : 2019-20

## Class-XII

# COMPUTER SCIENCE

# केंद्रीय विद्यालय संगठन

## KENDRIYA VIDYALAYA SANGATHAN

तत् त्वं पूषन् अपावृणु
केन्द्रीय विद्यालय संगठन

अध्ययन सामग्री

STUDY MATERIAL

कक्षा - बारहवीं

CLASS – XII

# संगणक विज्ञान

## COMPUTER SCIENCE

सत्र 2019-20

SESSION - 2019-20

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

तत् त्वं पूषन् अपावृणु
केन्द्रीय विद्यालय संगठन

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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.)

Computer Science

# STUDENT SUPPORT MATERIAL

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**BLUE PRINT: CLASS XII**
**COMPUTER SCIENCE (083) Theory**

| Unit No. | Unit Name | Marks |
|---|---|---|
| 1. | Programming and Computational Thinking – 2 | 30 |
| 2. | Computer Networks | 15 |
| 3. | Data Management – 2 | 15 |
| 4. | Society, Law and Ethics – 2 | 10 |
| 5. | Practicals | 30 |
| | Total | 100 |

**Computer Science (New) Syllabus**
**CLASS-XII (Code No. 083 )**
**SESSION 2019-20**

**1. Prerequisites**

Computer Science- Class XI

2. Learning Outcomes

1. Understand the concept of functions and recursion.
2. Learn how to create and use Python libraries.
3. Learn file handling.
4. Learn about the concept of efficiency in algorithms and computing in general.
5. Learn basic data structures: lists, stacks, and queues.
6. Get a basic understanding of computer networks: network stack, basic network hardware, basic protocols, and basic tools.
7. Connect a Python program with an SQL database, and learn aggregation functions in SQL.
8. Have a clear understanding of cyber ethics and cybercrime. Understand the value of technology in societies, gender and disability issues, and the technology behind biometric ids.

3.1 Unit 1: Programming and Computational Thinking (PCT-2) (80 Theory + 70 Practical)

- Revision of the basics of Python
- Functions: scope, parameter passing, mutable/immutable properties of data objects, pass arrays to functions, return values, functions using libraries: mathematical, and string functions.
- File handling: open and close a file, read, write, and append to a file, standard input, output, and error streams, relative and absolute paths.
- Using Python libraries: create and import Python libraries
- Recursion: simple algorithms with recursion: factorial, Fibonacci numbers; recursion on arrays: binary search
- Idea of efficiency: performance defined as inversely proportional to the wall clock time, count the number of operations a piece of code is performing, and measure the time taken by a program. Example: take two different programs for the same problem, and understand how the efficient one takes less time.
- Data visualization using Pyplot: line chart, pie chart, and bar chart. Data-structures: lists, stacks, queues.

3.2 Unit 2: Computer Networks (CN) (30 Theory + 10 Practical)

- Structure of a network: Types of networks: local area and wide area (web and internet), new technologies such as cloud and IoT, public vs. private cloud, wired and wireless networks; concept of a client and server.
- Network devices such as a NIC, switch, hub, router, and access point.

- Network stack: amplitude and frequency modulation, collision in wireless networks, error checking, and the notion of a MAC address, main idea of routing. IP addresses: (v4 and v6), routing table, router, DNS, and web URLs, TCP: basic idea of retransmission, and rate modulation when there is congestion (analogy to a road network), Protocols: 2G, 3G, 4G, WiFi. What makes a protocol have a higher bandwidth?
- Basic network tools: traceroute, ping, ipconfig, nslookup, whois, speed-test.
- Application layer: HTTP (basic idea), working of email, secure communication: encryption and certificates (HTTPS), network applications: remote desktop, remote login, HTTP, FTP, SCP, SSH, POP/IMAP, SMTP, VoIP, NFC.

4.3 Unit 3: Data Management (DM-2) (20 Theory + 20 Practical)

- Write a minimal Django based web application that parses a GET and POST request, and writes the fields to a file - flat file and CSV file.
- Interface Python with an SQL database
- SQL commands: aggregation functions – having, group by, order by.

4.4. Unit 4: Society, Law and Ethics (SLE-2) (10 Theory)

- Intellectual property rights, plagiarism, digital rights management, and licensing (Creative Commons, GPL and Apache), open source, open data, privacy.
- Privacy laws, fraud; cyber-crime- phishing, illegal downloads, child pornography, scams; cyber forensics, IT Act, 2000.
- Technology and society: understanding of societal issues and cultural changes induced by technology.
- E-waste management: proper disposal of used electronic gadgets.
- Identity theft, unique ids, and biometrics.
- Gender and disability issues while teaching and using computers.

5. Practical

| S.No. | Unit Name | Marks (Total=30) |
|---|---|---|
| 1. | **Lab Test (10 marks)** | |
| | Python program (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 |
| 2. | **Report File + viva(9 marks)** | |
| | 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 program should implement the web server to write user data to a CSV file. | **7** |
| | Viva voce based on the report file | 2 |
| 3. | **Project + viva (11 marks)** | |
| | Project (that uses most of the concepts that have been learnt) | 8 |
| | Project viva voce | 3 |

Some sample lab assignments are as follows:

**5.1. Programming in Python:**

- Recursively find the factorial of a natural number.
- Read a file line by line and print it.
- Remove all the lines that contain the character `a' in a file and write it to another file.

- Write a Python function sin(x, n) to calculate the value of sin(x) using its Taylor series expansion up to n terms. Compare the values of sin(x) for different values of n with the correct value.
- Write a random number generator that generates random numbers between 1 and 6 (simulates a dice).
- Write a recursive code to find the sum of all elements of a list.
- Write a recursive code to compute the $n^{th}$ Fibonacci number.
- Write a Python program to implement a stack and queue using a list data-structure.
- Write a recursive Python program to test if a string is a palindrome or not.
- Write a Python program to plot the function $y = x^2$ using the pyplot or matplotlib libraries.
- Create a graphical application that accepts user inputs, performs some operation on them, and then writes the output on the screen. For example, write a small calculator. Use the tkinter library.
- Open a webpage using the urllib library.
- Compute EMIs for a loan using the numpy or scipy libraries.
- Take a sample of 10 phishing e-mails and find the most common words.

5.2. Data Management: SQL and web-server

- Find the min, max, sum, and average of the marks in a student marks table.
- Find the total number of customers from each country in the table (customer ID, customer name, country) using group by.
- Write a SQL query to order the (student ID, marks) table in descending order of the marks.
- Integrate SQL with Python by importing the MySQL module
- Write a Django based web server to parse a user request (POST), and write it to a CSV file.

6. 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 worthwhile 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.

# UNIT 1 : PROGRAMMING AND COMPUTATIONAL THINKING – 2

## CHAPTER 1: REVISION OF THE BASICS OF PYTHON

- **Python (a computer language)** :
  - Python is a powerful and high level language and it is an interpreted language.
  - It is widely used general purpose, high level programming language developed by Guido van Rossum in 1991.
  - Python has two basic modes: **interactive and script.**In **interactive mode (python.exe/py.exe),** the result is returned immediately after pressing the enter key. In **script mode (IDLE),** a file must be created and saved before executing the code to get results.

**Basics of Python: Output**

| | |
|---|---|
| **Simple Hello world Program**<br>print('hello world')<br>print("HELLO WORLD") | **Output**<br>hello world<br>HELLO WORLD |
| **Declaring/Defining variable**<br>a=10<br>b=20<br>c=a+b<br>print(c)<br>d,e=2,3<br>print(d,e) | **Output**<br>30<br>2 3 |
| **Output Formatting**<br>a,b=10,20<br>c=a+b<br>print("The addition of a and b is ", c)<br>print("The addition of ",a,"and ", b, "is ",c)<br>print("The addition of %d and %d is %d" %(a,b,c)) | **Output**<br>The addition of a and b is 30<br>The addition of 10 and 20 is 30<br>The addition of 10 and 20 is 30 |
| name="XYZ"<br>age=26<br>salary=65748.9312<br>print("The age of %s is %d and salary is %.2f"%(name,age,salary)) | **Output**<br>The age of XYZ is 26 and salary is 65748.93 |

**Basics of Python: Input**

| | |
|---|---|
| **Accepting input without prompt**<br>name=input()<br>print(name) | **Output**<br>Govind<br>Govind |
| **Accepting input with prompt**<br>name=input("Enter your name : ")<br>print("My name is ",name) | **Output**<br>Enter your name : Govind<br>My name is Govind |
| **Accepting formatted input (Integer, float, etc.)**<br>a=int(input("Enter any integer number :"))<br>b=float(input("Enter any float number :"))<br>print("Entered integer is : ",a)<br>print("Entered float is : ",b) | **Output**<br>Enter any integer number :10<br>Enter any float number :3.14<br>Entered integer is : 10<br>Entered float is : 3.14 |

**<u>Keywords in Python</u>**

There are 33 keywords in Python 3.7. This number can vary slightly in the course of time. All the keywords except True, False and None are in lowercase and they must be written as it is. The list of all the keywords is given below.

**and del from not while as elif global or with assert else if pass yield break except import print class exec in raise continue finally is return def for lambda try**

## Operators in Python

Python language supports the following types of operators-

- Arithmetic Operators
- Relational Operators
- Assignment Operators
- Logical Operators
- Bitwise Operators
- Membership Operators
- Identity Operators

## Operators in Python: Arithmetic

Assume a=10 and b=20

| Operator | Description | Example |
|---|---|---|
| + Addition | Adds values on either side of the operator. | a + b = 30 |
| - Subtraction | Subtracts right hand operand from left hand operand. | a – b = -10 |
| * Multiplication | Multiplies values on either side of the operator | a * b = 200 |
| / Division | Divides left hand operand by right hand operand | b / a = 2 |
| % Modulus | Divides left hand operand by right hand operand and returns remainder | b % a = 0 |
| ** Exponent | Performs exponential (power) calculation on operators | a**b =10 to the power 20 |
| // | Floor Division - The division of operands where the result is the quotient in which the digits after the decimal point are removed. But if one of the operands is negative, the result is floored, i.e., rounded away from zero (towards negative infinity) – | 9//2 = 4 and 9.0//2.0 = 4.0, -11//3 = -4, -11.0//3 = -4.0 |

## Operators in Python: Relational

Relational Operators are used to show relationship between two values or variables. Following are the relational operators < (less than), >(greater than) , <= (less than equal to), >= (greater than equal too) ,!= (Not equal to) and = = (equality check operator)

## Logical Operator in Python

There are following logical operators supported by Python language. Assume variable a holds 10 and variable b holds 20 then –

| Operator | Description | Example |
|---|---|---|
| and Logical AND | If both the operands are true then condition becomes true. | (a and b) is true. |
| or Logical OR | If any of the two operands are non-zero then condition becomes true. | (a or b) is true. |
| not Logical NOT | Used to reverse the logical state of its operand. | Not(a and b) is false. |

## Operators in Python: Assignment

Assume variable a holds 10 and variable b holds 20, then –

| Operator | Description | Example |
|---|---|---|
| = | Assigns values from right side operands to left side operand | c = a + b assigns value of a + b into c |
| += Add AND | It adds right operand to the left operand and assign the result to left operand | c += a is equivalent to c = c + a |
| -= Subtract AND | It subtracts right operand from the left operand and assign the result to left operand | c -= a is equivalent to c = c - a |
| *= Multiply AND | It multiplies right operand with the left operand and assign the result to left operand | c *= a is equivalent to c = c * a |
| /= Divide AND | It divides left operand with the right operand and assign the result to left operand | c /= a is equivalent to c = c / ac /= a is equivalent to c = c / a |
| %= Modulus AND | It takes modulus using two operands and assign the result to left operand | c %= a is equivalent to c = c % a |
| **= Exponent AND | Performs exponential (power) calculation on operators and assign value to the left operand | c **= a is equivalent to c = c ** a |
| //= Floor Division | It performs floor division on operators and assign value to the left operand | c //= a is equivalent to c = c // a |

## Operators in Python: Bitwise

Bitwise operator works on bit and performs bit by bit operation. Assume if –
A=60 and B=13; now in binary they will be as follows
A(60)=00111100
B(13)=00001101

a&b = 0000 1100 (Use of bitwise Binary AND)

a|b = 0011 1101 (Use of bitwise Binary OR)

a^b = 0011 0001 (Use of bitwise XOR)

~a = 1100 0011 (Use of ones complement)

## Operators in Python: Membership

Python's membership operators test for membership in a sequence, such as strings, lists, or tuples. There are two membership operators as explained below –

| Operator | Description | Example |
|---|---|---|
| in | Evaluates to true if it finds a variable in the specified sequence and false otherwise. | x in y, here in results in a 1 if x is a member of sequence y. |
| not in | Evaluates to true if it does not finds a variable in the specified sequence and false otherwise. | x not in y, here not in results in a 1 if x is not a member of sequence y. |

```
list=[1, 2, 3, 4, 5]
print("Elements in the list: ",list)
if(3 in list):
   print(3, "available in the list")
else:
   print(3, "Not available in the list")
```

**Output**

```
Elements in the list:  [1, 2, 3, 4, 5]
3 available in the list
```

## Operators in Python: Identity

Identity operators compare the memory locations of two objects. There are two Identity operators as explained below –

| Operator | Description | Example |
|---|---|---|
| is | Evaluates to true if the variables on either side of the operator point to the same object and false otherwise. | x is y, here is results in 1 if id(x) equals id(y). |
| is not | Evaluates to false if the variables on either side of the operator point to the same object and true otherwise. | x is not y, here is not results in 1 if id(x) is not equal to id(y). |

```
a,b = 20,20
print("ID of a :",id(a)," ID of b :",id(b))
if(a is b):
   print("a and b have same identity")
else:
   print("a and b do not have same identity")
```

**Output**

```
ID of a : 1442604432  ID of b : 1442604432
a and b have same identity
```

## Control Statements in Python

Control statements are used to control the flow of execution depending upon the specified condition/logic.
There are three types of control statements-
1. Decision Making Statements (if, elif, else)
2. Iteration Statements (while and for Loops)
3. Jump Statements (break, continue, pass)

| | | |
|---|---|---|
| **Decision Making Statements (if, elif, else)**<br>**Syntax:**<br>if(logic):<br>  Statement/s<br>elif(logic):<br>  Statement/s<br>else:<br>  Statement/s | **Program**<br>a=int(input("Enter any integer number :"))<br>if(a==0):<br>  print("Number is Zero")<br>elif(a>0):<br>  print("Number is Positive")<br>else:<br>  print("Number is negative") | **Output**<br>Enter any integer number :5<br>Number is Positive |
| **Iteration Statements (while loop)**<br>**Syntax:**<br>while(condition):<br>  Statement/s | **Program**<br>n=1<br>while(n<4):<br>  print("Govind ", end=" ")<br>  n=n+1 | **Output**<br>Govind Govind Govind |
| **Iteration Statements (for loop)**<br>**Syntax:**<br>for value in sequence:<br>  Statement/s | **Program**<br>for i in range(1,6):<br>  print(i, end=' ') | **Output**<br>1 2 3 4 5 |

| | | |
|---|---|---|
| **Jump Statements (break, continue, pass)**<br>**Syntax**<br>for val in sequence:<br>  if (val== i):<br>  break<br>if (val== j):<br>  continue<br>  if (val== k):<br>  pass | **Program**<br>for i in range(1,11):<br>  if(i==3):<br>  print("hello", end=' ')<br>  continue<br>  if(i==8):<br>  break<br>  if(i==5):<br>  pass<br>  else:<br>  print(i, end=' '); | **Output**<br>1 2 hello 4 6 7 |

## List in Python

It is a collections of items and each item has its own index value.
Index of first item is 0 and the last item is n-1.Here n is number of items in a list.

Indexing of list

| | | | | | |
|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | index |
| 80 | 60 | 70 | 85 | 75 | value |
| -5 | -4 | -3 | -2 | -1 | Negative index |

| **Creating a list and accessing its elements** | **Output** |
|---|---|
| a=[10,20,'abc',30,3.14,40,50]<br>print(a)<br>for i in range(0,len(a)):<br>  print(a[i], end=' ')<br>print('\n')<br>for i in range(len(a)-1,-1,-1):<br>  print(a[i], end=' ')<br>print('\n')<br>for i in a[::-1]:<br>  print(i, end=' ')<br>print('\n')<br>for i in reversed(a):<br>  print(i, end=' ') | [10, 20, 'abc', 30, 3.14, 40, 50]<br>10 20 abc 30 3.14 40 50<br>50 40 3.14 30 abc 20 10<br>50 40 3.14 30 abc 20 10<br>50 40 3.14 30 abc 20 10 |

## Tuple in Python

It is a sequence of immutable objects. It is just like a list. Difference between a tuple and a list is that the tuple cannot be changed like a list. List uses square bracket whereas tuple use parentheses.

L=[1,2,3,4,5] Mutable Elements of list can be changed
T=(1,2,3,4,5) Immutable Elements of tuple can not be changed

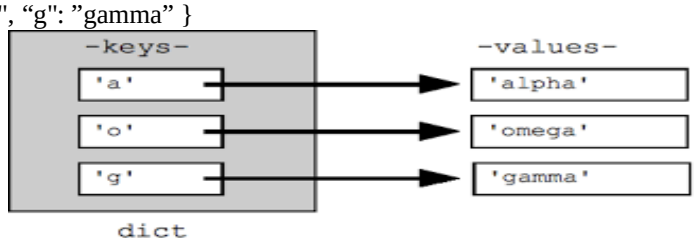
| **Creating a tuple and accessing its elements** | **Output** |
|---|---|
| a=(10,20,'abc',30,3.14,40,50)<br>print(a)<br>for i in range(0,len(a)):<br>  print(a[i], end=' ')<br>print('\n')<br>for i in range(len(a)-1,-1,-1):<br>  print(a[i], end=' ')<br>print('\n')<br>for i in a[::-1]:<br>  print(i, end=' ')<br>print('\n')<br>for i in reversed(a):<br>  print(i, end=' ') | (10, 20, 'abc', 30, 3.14, 40, 50)<br>10 20 abc 30 3.14 40 50<br>50 40 3.14 30 abc 20 10<br>50 40 3.14 30 abc 20 10<br>50 40 3.14 30 abc 20 10 |

| **Function** | **Description** |
|---|---|
| tuple(seq) | Converts a list into a tuple. |
| min(tuple) | Returns item from the tuple with min value. |
| max(tuple) | Returns item from the tuple with max value. |
| len(tuple) | Gives the total length of the tuple. |
| cmp(tuple1,tuple2) | Compares elements of both the tuples. |

## Dictionary in Python

Dictionary in Python is an unordered collection of data values, used to store data values along with the keys. Dictionary holds key: value pair. Key value is provided in the dictionary to make it more optimized. Each key-value pair in a Dictionary is separated by a colon:, whereas each key is separated by a 'comma'.

dict={ “a": “alpha", “o": “omega", “g": ”gamma” }




| | |
|---|---|
| **# Creating an empty Dictionary**<br>Dict = {}<br>print("Empty Dictionary: ")<br>print(Dict)<br><br>**# Creating a Dictionary with Integer Keys**<br>Dict = {1: ‘AAA', 2: ‘BBB', 3: ‘CCC'}<br>print("\nDictionary with the use of Integer Keys: ")<br>print(Dict)<br><br>**# Creating a Dictionary with Mixed keys**<br>Dict = {'Name': ‘Govind', 1: [10, 11, 12, 13]}<br>print("\nDictionary with the use of Mixed Keys: ")<br>print(Dict)<br><br>**# Creating a Dictionary with dict() method**<br>D=dict({1: 'AAA', 2: 'BBB', 3:'CCC'})<br>print("\nDictionary with the use of dict(): ")<br>print(D)<br><br>**# Creating a Dictionary with each item as a Pair**<br>D=dict([(1, 'AAA'), (2, 'BBB')])<br>print("\nDictionary with each item as a pair: ")<br>print(D) | Output<br>Empty Dictionary:<br>{}<br>Dictionary with the use of Integer Keys:<br>{1: ‘AAA', 2: ‘BBB', 3: ‘CCC'}<br>Dictionary with the use of Mixed Keys:<br>{'Name': 'Govind', 1: [10, 11, 12, 13]}<br>Dictionary with the use of dict():<br>{1: 'AAA', 2: 'BBB', 3: 'CCC'}<br>Dictionary with each item as a pair:<br>{1: 'AAA', 2: 'BBB'} |
| # Creating an empty Dictionary<br>Dict = {}<br>print("Empty Dictionary: ")<br>print(Dict)<br><br># Adding elements one at a time<br>Dict[0] = ‘Govind'<br>Dict[2] = ‘Prasad'<br>Dict[3] = ‘Arya’<br>print("\nDictionary after adding 3 elements: ")<br>print(Dict)<br><br># Adding set of values<br># to a single Key<br>Dict['V'] = 1, 2<br>print("\nDictionary after adding 3 elements: ")<br>print(Dict)<br><br># Updating existing Key's Value<br>Dict[‘V’] = 3,4<br>print("\nUpdated dictionary: ")<br>print(Dict) | Empty Dictionary:<br>{}<br>Dictionary after adding 3 elements:<br>{0: 'Govind', 2: ‘Prasad', 3: ‘Arya’}<br>Dictionary after adding 3 elements:<br>{{0: 'Govind', 2: ‘Prasad', 3: ‘Arya’} , 'V': (1, 2,)}<br>Updated dictionary:<br>{{0: 'Govind', 2: ‘Prasad', 3: ‘Arya’} , 'V': (3, 4,)} |

| | |
|---|---|
| # Creating a Dictionary<br>D = {1: ‘Prasad', 'name': ‘Govind', 3: ‘Arya'}<br><br># accessing a element using key<br>print("Accessing a element using key:")<br>print(D['name'])<br><br># accessing a element using key<br>print("Accessing a element using key:")<br>print(D[1])<br><br># accessing a element using get() method<br>print("Accessing a element using get:")<br>print(D.get(3)) | Output<br>Accessing a element using key:<br>Govind<br>Accessing a element using key:<br>Prasad<br>Accessing a element using get:<br>Arya |
| D={1:'AAA', 2:'BBB', 3:'CCC'}<br>print("\n all key names in the dictionary, one by one:")<br>for i in D:<br>  print(i, end=' ')<br>print("\n all values in the dictionary, one by one:")<br>for i in D:<br>  print(D[i], end=' ')<br>print("\n all keys in the dictionary using keys() method:")<br>for i in D.keys():<br>  print(i, end=' ')<br><br>print("\n all values in the dictionary using values() method:")<br>for i in D.values():<br>  print(i, end=' ')<br>print("\n all keys and values in the dictionary using items()method:")<br>for k, v in D.items():<br>  print(k, v, end=' ') | Output<br>all key names in the dictionary, one by one:<br>1 2 3<br>all values in the dictionary, one by one:<br>AAA BBB CCC<br>all keys in the dictionary using keys() method:<br>1 2 3<br>all values in the dictionary using values() method:<br>AAA BBB CCC<br>all keys and values in the dictionary using items()method:<br>1 AAA 2 BBB 3 CCC |

## Very Short Answer Type Questions (1-Mark)

Q1. What is None literal in Python?
Ans: Python has one special literal called “None”. It is used to indicate something that has not yet been created. It is a legal empty value in Python.
Q2.Can List be used as keys of a dictionary?
Ans: No, List can’t be used as keys of dictionary because they are mutable. And a python dictionary can have only keys of immutable types.

## Short Answer Type Questions (2-Marks)

Q1. What is a python variable? Identify the variables that are invalid and state the reason
Class, do, while, 4d, a+
Ans: - A variable in python is a container to store data values.

a) do, while are invalid because they are python keyword
b) **4d** is invalid because the name can’t be started with a digit.
c) **a+** is also not validas no special symbol can be used in name except underscore ( _ ).

Q.2 Predict the output

```
for  i in range( 1, 10, 3):
        print(i)
```

**Ans: -** 1
4
**7**

Q3**.** Rewrite the code after correcting errors: -

```
if N=>0
    print(odd)
else
    Print("even")
```

Ans: -

```
if N>=0:
        print("odd")
else:
        print("even")
```

Q.4 What problem occurs with the following code

```
X=40
while X< 50 :
    print(X)
```

Ans: - The given code does not have the incrementing value of X, thus the loop becomes endless.

Q5. What will be the output of the following code snippet?

```
values =[ ]
for i in range (1,4):
        values.append(i)
print(values)
```

Ans: [1]
[1 ,2 ]
[1,2,3]

Q6. Find the error in following code. State the reason of the error.

```
aLst = { 'a':1 ,' b':2, 'c':3 }
print (aLst['a','b'])
```

Ans: The above code will produce **KeyError**, the reason being that **there is no key** same as the list **['a','b']** in dictionary aLst.

**Application Based Questions ( 3 Marks)**

Q1. Find output of the following code fragment.

```
x="hello world"
print(x[:2],x[:-2],x[-2:])
print(x[6],x[2:4])
print(x[2:-3],x[-4:-2])
```

Ans: he hello wor ld
w ll
llo wo or

Q2. Rewrite the following programs after removing syntactical errors:

```
for=20
for1=50:
for3=for+for1+for2
print(for3)
```

Ans:

```
f=20 #( as for is a keyword in python)
 for1=50 #(: can not be used here)
for3=f+for1 #(for2 not defined)
print(for3)
```

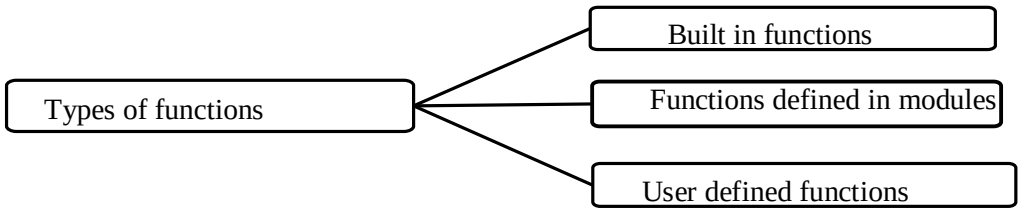
# CHAPTER-2 FUNCTIONS IN PYTHON

**Learning Outcomes: Understand the concept of functions in Python.**

**Definition:** Functions are the subprograms that perform specific task. Functions are the small modules.

**Types of Functions:**

There are **three** types of functions in python:




**Library Functions:** These functions are already built in the python library.

**Functions defined in modules:** These functions defined in particular modules. When you want to use these functions in program, you have to import the corresponding module of that function.

**User Defined Functions:** The functions those are defined by the user are called user defined functions.

**Library Functions in Python:**

These functions are already built in the library of python.

For example: type( ), len( ), input( ) etc.

**Functions defined in modules:**

**Functions of math module:**

To work with the functions of math module, we must import math module in program.

**import math**

| S. No. | Function | Description | Example |
|---|---|---|---|
| 1 | sqrt( ) | Returns the square root of a number | >>>math.sqrt(49)<br>7.0 |
| 2 | ceil( ) | Returns the upper integer | >>>math.ceil(81.3)<br>82 |
| 3 | floor( ) | Returns the lower integer | >>>math.floor(81.3)<br>81 |
| 4 | pow( ) | Calculate the power of a number | >>>math.pow(2,3)<br>8.0 |
| 5 | fabs( ) | Returns the absolute value of a number | >>>math.fabs(-5.6)<br>5.6 |
| 6 | exp( ) | Returns the e raised to the power i.e. $e^3$ | >>>math.exp(3)<br>20.085536923187668 |

Function in **random** module:

randint( )- function generates the random integer values including start and end values.

Syntax: randint(start, end)

It has two parameters. Both parameters must have integer values.

Example:

import random n=random.randint(3,7)

*The value of n will be 3 to 7.

## User defined functions:

The syntax to define a function is: **def function-name ( parameters) :**
**#statement(s)**

**Where:**
Keyword **def** marks the start of function header.
A function name to uniquely identify it. Function naming follows the same rules of writing identifiers in Python.
Parameters (arguments) through which we pass values to a function. They are optional.
A colon (**:**) to mark the end of function header.
One or more valid python statements that make up the function body. Statements must have same indentation level.
An optional return statement to return a value from the function.

**Example:**

```
def display(name):
        print("Hello  " +   name    + "  How are you?")
```

## Function Parameters:

A functions has two types of parameters:
**Formal Parameter**: Formal parameters are written in the function prototype and function header of the definition. Formal parameters are local variables which are assigned values from the arguments when the function is called.
**Actual Parameter**: When a function is *called*, the values that are passed in the call are called *actual parameters*. At the time of the call each actual parameter is assigned to the corresponding formal parameter in the function definition.
Default Parameters: Python allows function arguments to have default values. If the function is called without the argument, the argument gets its default value.

**Example :**

```
def ADD(x, y):                  #Defining a function and x and y are formal parameters
        z=x+y
        print("Sum = ", z)
a=float(input("Enter first number: " ))
b=float(input("Enter second number: " ))
ADD(a,b)      #Calling the function by passing actual parameters
```

In the above example, **x** and **y** are formal parameters. **a** and **b** are actual parameters.

**Calling the function:**
Once we have defined a function, we can call it from another function, program or even the Python prompt. To call a function we simply type the function name with appropriate parameters.

**Syntax:**
function-name(parameter)

**Example:**
ADD(10,20)

**OUTPUT:**
Sum = 30.0

**The return statement:**
The **return** statement is used to exit a function and go back to the place from where it was called.
There are two types of functions according to return statement:

a. Function returning some value
b. Function not returning any value

**a. Function returning some value :**

**Syntax:**
**return expression/value**

**Example-1: Function returning one value**

```
def my_function(x):
        return 5 * x
```

**Example-2 Function returning multiple values:**

```
def sum(a,b,c):
        return a+5, b+4, c+7
S=sum(2,3,4)        # S will store the returned values as a tuple
print(S)
```

**OUTPUT:** (7, 7, 11)

**Example-3: Storing the returned values separately:**

```
def sum(a,b,c):
    return a+5, b+4, c+7
s1, s2, s3=sum(2, 3, 4)        # storing the values separately
print(s1, s2, s3)
```

**OUTPUT:**

7 7 11

**b. Function not returning any value :** The function that performs some operations but does not return any value, called void function.

```
def message():
    print("Hello")

m=message()
print(m)
```

**OUTPUT: Hello**

**None**

**Scope and Lifetime of variables:**

Scope of a variable is the portion of a program where the variable is recognized. Parameters and variables defined inside a function is not visible from outside. Hence, they have a local scope.

There are two types of scope for variables:

i) Local Scope
ii) Global Scope

**Local Scope:** Variable used inside the function. It cannot be accessed outside the function. In this scope, the lifetime of variables inside a function is as long as the function executes. They are destroyed once we return from the function. Hence, a function does not remember the value of a variable from its previous calls.

**Global Scope:** Variable can be accessed outside the function. In this scope, Lifetime of a variable is the period throughout which the variable exits in the memory.

**Example:**

```
def my_func():    x = 10
                  print("Value inside function:",x)
x = 20
 my_func()
print("Value outside function:",x)
```

**OUTPUT:**

Value inside function: 10
Value outside function: 20

Here, we can see that the value of **x** is **20** initially. Even though the function my_func()changed the value of **x** to **10**, it did not affect the value outside the function.

This is because the variable **x** inside the function is different (local to the function) from the one outside. Although they have same names, they are two different variables with different scope.

On the other hand, variables outside of the function are visible from inside. They have a **global** scope.

We can read these values from inside the function but cannot change (write) them. In order to modify the value of variables outside the function, they must be declared as global variables using the keyword **global**.

**Very Short Answer Type Questions (1-Mark)**

Q1. What is default parameter?

Ans: A parameter having default value in the function header is known as a default parameter.

Q2. Can a function return multiple values in python?

Ans: YES.

**Short Answer Type Questions (2-Marks)**

Q1. Rewrite the correct code after removing the errors: -

```
def SI(p,t=2,r):
    return (p*r*t)/100
```

Ans: -

```
def SI(p, r, t=2):
    return(p*r*t)/100
```

**Q2.** Consider the following function headers. Identify the correct statement: -
1) def correct(a=1,b=2,c): 2) def correct(a=1,b,c=3):
3) def correct(a=1,b=2,c=3): 4) def correct(a=1,b,c):
**Ans: - 3) def correct(a=1,b=2,c=3)**

Q3.What will be the output of the following code?

```
a=1
def f():
    a=10
print(a)
```

Ans: The code will print 1 to the console.

**Application Based Questions ( 3 Marks)**

Q1. Write a python program to sum the sequence given below. Take the input ***n*** from the user.

$$1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \cdots + \frac{1}{n!}$$

**Solution:**

```
def fact(x):
 j=1   ,  res=1
        while j<=x:
                res=res*j
                 j=j+1
    return res
n=int(input("enter the number : "))
 i=1, sum=1
while i<=n:
        f=fact(i)
        sum=sum+1/f
        i+=1
print(sum)
```

**Q2. Write a program to compute GCD and LCM of two numbers**

```
def gcd(x,y):
        while(y):
                x, y = y, x % y
        return x
def lcm(x, y):
        lcm = (x*y)//gcd(x,y)
        return lcm
num1 = int(input("Enter first number: "))
num2 = int(input("Enter second number: "))
print("The L.C.M. of", num1,"and", num2,"is", lcm(num1, num2))
print("The G.C.D. of", num1,"and", num2,"is", gcd(num1, num2))
```

Q3. How many values a python function can return? Explain how?
Ans: Python function can return **more than one** values.

```
def square_and_cube(X):
        return X*X, X*X*X, X*X*X*X
a=3
x,y,z=square_and_cube(a)
print(x,y,z)
```

Q4. Find the output of the following code: -
Ans: -

```
def CALLME(n1=1,n2=2):
        n1=n1*n2
        n2+=2
        print(n1,n2)
CALLME()
CALLME(2,1)
```

```
CALLME(3)
```

Ans: -
**2 4**
**2 3**
**6 4**

Q5. **Predict the output of the following code fragment?**

```
def check(n1=1, n2=2):
    n1=n1+n2
    n2+=1
    print(n1,n2)
check()
check(2,1)
check(3)
```

Ans:
3 3
3 2
5 3

# CHAPTER-3 FILE HANDLING

**Learning Outcomes: Learn file handling in Python.**

**INTRODUCTION:**

**File:-** A file is a collection of related data stored in computer storage for future data retrieval.

**Stream: -** It refers to a sequence of bytes.

File handling refres to reading and writing contents from a file.

**Data Files:**

Data files can be stored in two ways:

1. **Text Files**: Text files are structured as a sequence of lines, where each line includes a sequence of characters.
2. **Binary Files** : A binary file is any type of file that is not a text file.

| S. No. | Text Files | Binary Files |
|---|---|---|
| 1. | Stores information in ASCII characters. | Stores information in the same format which the information is held in memory. |
| 2. | Each line of text is terminated with a special character known as EOL (End of Line) | No delimiters are used for a line. |
| 3. | Some internal translations take place when this EOL character is read or written. | No translation occurs in binary files. |
| 4. | Slower than binary files. | Binary files are faster and easier for a program to read and write the text files. |

**Opening and closing a file:**

**Opening a file:** To work with a file, first of all you have to open the file. To open a file in python, we use open( ) function.

The **open( )** function takes two parameters; *filename*, and *mode*. **open( )** function returns a file object.

**Syntax:** file_objectname= open(filename, mode)

***Example:***

To open a file for reading it is enough to specify the name of the file: f = open("book.txt")

The code above is the same as:

f = open("book.txt", "rt")
Where "r" for read mode, and "t" for text are the default values, you do not need to specify them.

**Closing a file:**

After performing the operations, the file has to be closed. For this, a close( ) function is used to close a file.

**Syntax:**

file-objectname.close( )

**File Modes:**

| **Text file mode** | **Binary File Mode** | **Description** |
|---|---|---|
| 'r' | 'rb' | Read - Default value. Opens a file for reading, error if the file does not exist. |
| 'w' | 'wb' | Write - Opens a file for writing, creates the file if it does not exist |
| 'a' | 'ab' | Append - Opens a file for appending, creates the file if it does not exist |
| 'r+' | 'rb+' | Read and Write-File must exist, otherwise error is raised. |
| 'w+' | 'wb+' | Read and Write-File is created if does not exist. |
| 'a+' | 'ab+' | Read and write-Append new data |
| 'x' | 'xb' | Create - Creates the specified file, returns an error if the file exists |

In addition you can specify if the file should be handled as binary or text mode

"t" – Text-Default value. Text mode

"b" – Binary- Binary Mode (e.g. images)

**WORKING WITH TEXT FILES:**

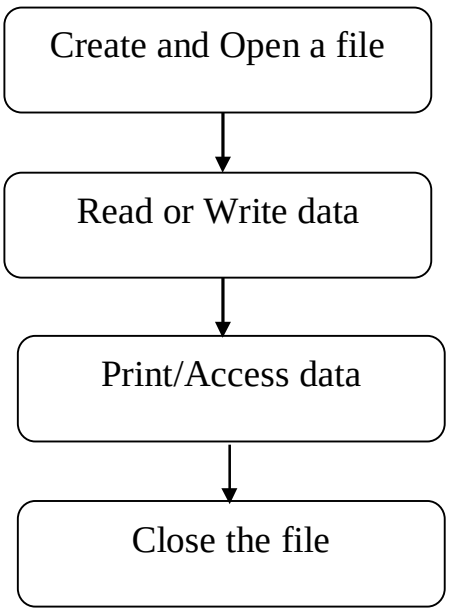
**Basic operations with files:**

a. **Read** the data from a file

b. **Write** the data to a file

c. **Append** the data to a file

d. **Delete** a file




**a. Read the data from a file:**

There are **3 types** of functions to read data from a file.

- **read( ) :** reads n bytes. if no n is specified, reads the entire file.
- **readline( ) :** Reads a line. if n is specified, reads n bytes.
- **readlines( ):** Reads all lines and returns a list.

**Steps to read data from a file:**

- Create and Open a file using open( ) function
- use the read( ), readline( ) or readlines( ) function
- print/access the data
- Close the file.

Let a text file **"Book.txt"** has the following text:

*"Python is interactive language. It is case sensitive language.*
*It makes the difference between uppercase and lowercase letters. It is official language of google."*

**Example-1: Program using read( ) function:**

| | |
|---|---|
| fin=open("D:\\python programs\\Book.txt",'r')<br>str=fin.read( )<br>print(str)<br>fin.close( ) | fin=open("D:\\python programs\\Book.txt",'r')<br>str=fin.read(10)<br>print(str)<br>fin.close( ) |
| **OUTPUT:**<br>Python is interactive language. It is case sensitive language.<br>It makes the difference between uppercase and lowercase letters.<br>It is official language of google. | **OUTPUT:**<br>Python is |

**Example-2: using readline( ) function:**

```
fin=open("D:\\python programs\\Book.txt",'r')
 str=fin.readline( )
print(str)
fin.close( )
```

**OUTPUT:**

Python is interactive language. It is case sensitive language.

**Example-3: using readlines( ) function:**

```
fin=open("D:\\python programs\\Book.txt",'r')
str=fin.readlines( )
print(str)
fin.close( )
```

**OUTPUT:**

**[**'Python is interactive language. It is case sensitive language.\n', 'It makes the difference between uppercase and lowercase letters.\n', 'It is official language of google.'**]**

**Some important programs related to read data from text files:**

**Program-a: Count the number of characters from a file. (Don't count white spaces)**

```
fin=open("Book.txt",'r')
str=fin.read()
L=str.split()
count_char=0
for i in L:
    count_char=count_char+len(i)
print(count_char)
fin.close( )
```

**Program-b: Count the number of words in a file.**

```
fin=open("Book.txt",'r')
str=fin.read()
L=str.split()
count_words=0
for i in L:
    count_words=count_words+1
print(count_words)
fin.close( )
```

**Program-c: Count number of lines in a text file.**

```
fin=open("Book.txt",'r')
str=fin.readlines()
count_line=0
for i in str:
    count_line=count_line+1
print(count_line)
fin.close( )
```

**Program-d: Count number of vowels in a text file.**

```
fin=open("D:\\python programs\\Book.txt",'r')
str=fin.read()
count=0
 for i in str:
        if i=='a' or i=='e' or i=='i' or i=='o' or i=='u':
        count=count+1
print(count)
 fin.close( )
```

**Program-e : Count the number of 'is' word in a text file.**

```
fin=open("D:\\python programs\\Book.txt",'r')
str=fin.read()
L=str.split()
count=0
for i in L:
```

```
        if i=='is':
  count=count+1
print(count)
fin.close( )
```

**b. Write data to a file:**

There are **2 types** of functions to write the data to a file.

- **write( ):**Write the data to a file.

Syntax:write(string) (for text files) write(byte_string) (for binary files)

- **writelines( )**: Write all strings in a list L as lines to file.

To write the data to an existing file, you have to use the following mode:
**"w"** - Write - will overwrite any existing content

**Example: Open the file "Book.txt" and append content to the file:**

```
fout= open("Book.txt", "a")

fout.write("Welcome to the world of Programmers")
```

**Example: Open the file "Book.txt" and overwrite the content:**

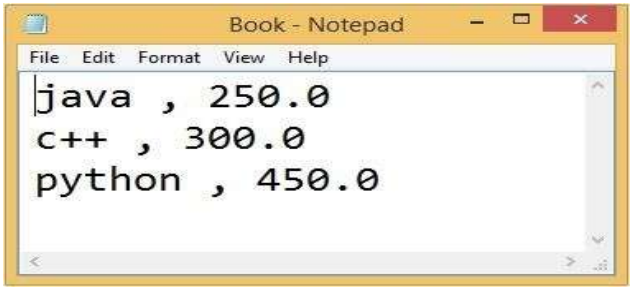
```
fout = open("Book.txt", "w")
fout.write("It is creative and innovative")
```

**Program: Write a program to take the details of book from the user and write the record in text file.**

```
fout=open("D:\\python programs\\Book.txt",'w')
n=int(input("How many records you want to write in a file ? :"))
for i in range(n):
    print("Enter details of record :", i+1)
    title=input("Enter the title of book : ")
    price=float(input("Enter price of the book: "))
    record=title+" , "+str(price)+'\n'
    fout.write(record)
fout.close( )
```

**OUTPUT:**

```
How many records you want to write in a file ? :3
Enter details of record : 1
Enter the title of book : java
Enter price of the book: 250
Enter details of record : 2
Enter the title of book : c++
Enter price of the book: 300
Enter details of record : 3
Enter the title of book : python
Enter price of the book: 450
```




**c. Append the data to a file:**

This operation is used to add the data in the end of the file. It doesn't overwrite the existing data in a file. To write the data in the end of the file, you have to use the following mode:

**"a"** - Append - will append to the end of the file.

**Program: Write a program to take the details of book from the user and write the record in the end of the text file.**

```
fout=open("D:\\python programs\\Book.txt",'a')
n=int(input("How many records you want to write in a file ? :"))
 for i in range(n):
        print("Enter details of record :", i+1)
        title=input("Enter the title of book : ")
        price=float(input("Enter price of the book: "))
        record=title+" , "+str(price)+'\n'
        fout.write(record)
```

**OUTPUT:**

How many records you want to write in a file ? :2

Enter details of record : 1

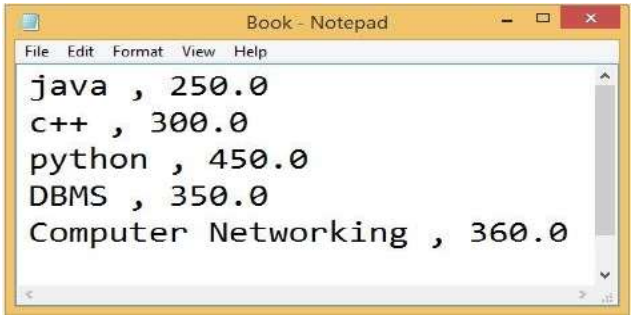
Enter the title of book : DBMS

Enter price of the book: 350

Enter details of record : 2

Enter the title of book : Computer Networking

Enter price of the book: 360




## WORKING WITH BINARY FILES:

Binary files are used to store binary data such as images,video files, audio files etc. They store data in the binary format (0's and 1's) .In Binary files there is no delimiter for a line. To open files in binary mode, when specifying a mode, add 'b' to it. Pickle module can be imported to write or read data in a binary file.

### (a) Write data to a Binary File:

**Example:**

```
import pickle
e={'Namita':25000,'Manya':30000,'Tanu':20000}
f1=open('emp.dat','wb')
pickle.dump(e,f1)
f1.close()
```

**Output:**

A file named emp.dat will be created in current working directory.

### (b) Read the data from Binary File:

**Example:**

```
import pickle
```

```
f1=open('emp.dat','rb')
e=pickle.load(f1)
for x in e:
   print(x)
f1.close()
```

**Output:**

```
Namita
Manya
Tanu
```

**Example** :

```
import pickle
f1=open('emp.dat','rb')
e=pickle.load(f1)
for x in e:
   if(e[x]>=25000 and e[x]<=30000):
      print(x)
f1.close()
```

**Output:**

```
Employees having salary between 25000 to 30000
Namita
Manya
```

**tell( ) and seek( ) methods:**

- **tell( ):** It returns the current position of cursor in file.

***Example:***

```
fout=open("story.txt","w")
fout.write("Welcome Python")
 print(fout.tell( ))
fout.close( )
```

**Output:**

14

- **seek(offset) :** Change the cursor position by bytes as specified by the offset.

**Example:**

```
fout=open("story.txt","w")
fout.write("Welcome Python")
fout.seek(5)
 print(fout.tell( ))
 fout.close( )
```

**Output:**

5

**File I/O Attributes**

| Attribute | Description |
|---|---|
| name | Returns the name of the file (Including path) |
| mode | Returns mode of the file. (r or w etc.) |
| encoding | Returns the encoding format of the file |
| closed | Returns True if the file closed else returns False |

***Example:***

```
f = open("D:\\story.txt", "r")
print("Name of the File:  ", f.name)
 print("File-Mode :  ", f.mode)
print("File encoding format : ", f.encoding)
print("Is File closed? ", f.closed)
f.close()
print("Is File closed? ", f.closed)
```

**OUTPUT:**

Name of the File:  D:\story.txt File-Mode :  r

File encoding format :  cp1252

Is File closed?  False

Is File closed?  True

**<u>Relative and Absolute Paths</u>** :

- We all know that the files are kept in directory which are also known as folders.
- Every running program has a current directory. Which is generally a default directory and python always see the default directory first.
- **The absolute paths are from the topmost level of the directory structure. The relative paths are relative to the current working directory denoted as a dot(.) while its parent directory is denoted with two dots(..).**
- OS module provides many such functions which can be used to work with files and directories. OS means Operating System.
- getcwd( ) is a very function which can be used to identify the current working directory

```
>>> import os
>>> cwd=os.getcwd()
>>> print(cwd)
C:\Users\kv2kkdSrSec\AppData\Local\Programs\Python\Python36-32
```

**<u>STANDARD FILE STREAMS</u>** :

• We use standard I/O Streams to get better performance from different I/O devices.

• Some Standard Streams in python are as follows –

– Standard input Stream sys.stdin

– Standard output Stream sys.stdout

– Standard error Stream sys.stderr

```
import sys
f=open(r"hello.txt")
line1=f.readline()
line2=f.readline()
line3=f.readline()
sys.stdout.write(line1)
sys.stdout.write(line2)
sys.stdout.write(line3)
sys.stderr.write("\nNo errors occured\n")
f.close()
```

**OUTPUT:**

```
Comp Science
Informatics Practices
Kendriya Vidyalaya AFS Salua
No errors occured
```

## Very Short Answer Type Questions (1-Mark)

**Q.1 What is a data file in python?**

Ans: A bunch of bytes / data stores on some storage device referred by the filename.

Q2. What is the difference between "w" and "a" modes?
Ans: "w" mode opens file in write mode but "a" mode opens file in append mode.

## Short Answer Type Questions (2-Mark)

**Q.1. Differentiate between a text file and a binary file.**

Ans: A text file stores data as ASCII/UNICODE characters where as a binary file stores data in binary format (as it is stored in memory). Internal conversion is required in text file and hence slower but binary file does not need any translation and faster.

Q2. **Differentiate between Absolute path and relative path.**

The absolute paths are from the topmost level of the directory structure. The relative paths are relative to the current working directory denoted as a dot(.) while its parent directory is denoted with two dots(..).

Q3. **What does stdin, stdout represent?**
Ans : *stdin* represent standard input device and *stdout* represent standard output device which are represented as files.

## Application Based Questions ( 3 Marks)

Q1. **Write a python code to find the size of the file in bytes, number of lines and number of words.**

```
# reading data from a file and find size, lines, words
f=open('Lines.txt','r')
str=f.read( )
size=len(str)
print('size of file n bytes',size)
f.seek(0)
L=f.readlines( )
word=L.split( )
print('Number of lines ',len(L))
print('Number of words ',len(word))
f.close( )
```

Q2. **Write code to print just the last line of a text file "data.txt".**

Ans:
```
fin=open("data.txt","r")
lineList=fin.readlines()
print("Last line = ", lineList[-1])
```

# CHAPTER 4 : USING PYTHON LIBRARIES

**Learning Outcomes: Learn how to create and use Python libraries**

**Python Libraries:**

Frequently used modules are generally known as libraries which contain code for general purpose.

•These libraries are the collection of methods, classes which can be used easily.

•Python program is made using 3 different components. -

–Library or package

–Module

–Functions/sub-modules

**Relation between Python Libraries, Module and Package:**

•A module is a file containing python definition, functions, variables, classes and statements. The extension of this file is ".py".

•While Python package, is directory (folder) of python modules.

•A library is collection of many packages in python.

**Module in Python:**

A module is a file containing python definition, functions, variables, classes and statements. The extension of this file is ".py".

•The name of module is the name of .py file e.g. in math.py the module name is math. And _name_ variable is used to store this module.

**•Advantages–**

–Its biggest advantage is that we can import its functionality in any program and use it.

–Reusability is one of the biggest advantages.

–It helps in logically organization of Python code.

–Programming becomes very easy when we use the collection of same types of codes.

–Categorization: same attributes can be stored in one module.

**Processing of import <module> command**

•When you run the import <module> command then the following things occur -

1. Imported module's code gets executed after interpretation.
2. All the programs and variables of imported module are present in the program.
3. A namespace setup is created for the imported module in the name of module.

**Processing of from <module> import <object> command**

•When you run the from<module> import <object> command then the following things occur -

1. Imported module's code gets executed after interpretation.
2. Only asked programs and variables of imported module are present in the program.
3. No namespace is created. Import objects of module are attached to current namespace.

**How to make modules in Python**?

•To make a module in python you have to make a .py file which has a name. Suppose we make a file "Shape.py".

•Then we write different functions of area within it.

•And we put it within same folder where our program is stored.

shape.py - C:/Users/KVBBKServer

File Edit Format Run Options Window Help

```
# This is a module named shape

def AreaCircle(r):
    return 3.14*r*r

def AreaRectangle(a,b):
    return a*b

def AreaCylinder(r,h):
    return 3.14*r*r*h
```

*calc.py - C:/Users/KVBBKServer/

File Edit Format Run Options Window Help

```
import shape
```

Or from shape import *

```
print(shape.AreaCircle(10))
print(shape.AreaRectangle(10,20))
print(shape.AreaCylinder(10,7))
```

**OUTPUT**

```
RESTART: C:/
314.0
200
2198.0
```

We used the module in our program by using import keyword. To use the members of module we use (.) as shown in the example.

**•Using from <module> import <function_name>**

```
calc.py - C:/Users/KVBBK
File  Edit  Format  Run  Options  Window  Help
from shape import AreaCircle

print(AreaCircle(10))
```

**OUTPUT**

```
RESTART:
314.0
>>>
```

By using "from shape import AreaCircle "only AreaCircle function is imported and to call this there is no need to use (.) operator.

**PACKAGE / LIBRARY:**

• Python Package is the collection of same type of modules.

• You can use built in package as well as your own package.

• Python Package is a simple directory. Modules are stored in that directory.

• Package or library are generally same.

• Steps to make a package is as follows – (Lets say package name is **geometry**)

1. We create a folder (directory) named **geometry** which will contain two files **area.py** and **volume.py**

2. In the same directory we will put another file named **"__init__.py**"

3.**__init__.py is necessary because this is the file which tells Python that directory is package. This file initializes the package.**

4. Then we import the package and use the content.

EXAMPLE:

Let's create a package named **Shape** and build three modules in it namely **Rect, Sq** and **Tri** to calculate the area for the shapes rectangle, square and triangle.

**Step-1** First create a directory and name it **Shape**. (In this case it is created under C:\Users\ViNi\AppData\Local\Programs\Python\Python37-32\ directory path.)

**Step-2** Create the modules in **Shape** directory.

To create **Module-1**(**Rect.py**), a file with the name Rect.py and write the code in it.

```
def Area( length, width):
        return length* breadth
```

To create **Module-2**(**Sq.py**), a file with the name Sq.py and write the code in it.

```
def Area(side):
    return a*a
```

To create **Module-3** (**Tri.py**), a file with the name Tri.py and write the code in it.

```
def Area( base, height):
    return ½*base*height
```

**Step-3 Create the __init__.py file.** This file will be placed inside **Shape** directory and can be left blank or we can put this initialisation code into it.

*from Shape import Rect*

*from Shape import Sq*

*from Shape import Tri*

That's all. Package created. Name of the package is Shape and it has three modules namely Rect, Sq and Tri.

**How to use the created package in a program:**

Following steps should be followed to use the created package.

**Step-1** Create a file main.py in the same directory where **Shape** package is located.

**Step-2** Write the following code in main.py file

```
from Shape import Rect
from Shape import Sq
from Shape import Tri

print("Area of Rectangle:",Rect.Area(10,20))       # Call the module Area( ) of Rectangle

print("Area of Square:",Sq.Area(5))            # Call the module Area( ) of Square

print("Area of Triangle:",Tri.Area(6,8))      # Call the module Area( ) of Triangle
```

**OUTPUT:**

Area of Rectangle is :  200

Area of square is :  25

Area of Triangle is :  24.0

**4.4 Import the package in program:**

**Method-1**

To use the package/library in a program, we have to import the package in the program. For this we use **import** keyword.

If we simply import the Shape package, then to access the modules and functions of **Shape** package, we have to write the following code:

**Syntax:**

Package-name.Module-name.function-name(parameter)

**Example:** import Shape
```
r=Shape.Rect.Area( )
s=Shape.Sq.Area( )
t=Shape.Tri.Area( )
```

**Method-2:**

If we want to access a specific module of a package then we can use ***from*** and ***import*** keywords.

**Syntax:**

from package-name import module-name

**Example:**

from Shape import Rect

r=Rect.Area( )

s=Sq.Area( )  This will give error, as we have imported only Rect module

**Method-3:**

If a user wants to import all the modules of Shape package then he/she can use ***** (asterisk).

**Example:**

from Shape import *

r=Rect.Area( )

s=Sq.Area( )

t=Tri.Area( )

## Very Short Answer Type Questions (1-Mark)

**Q1.** What is a Library in Python?

Ans: A Library is a **collection of modules** that together **caters to specific types of needs** or applications.**Like NumPy library of Python caters to scientific computing needs**.

Q2. What is module in Python?

Ans: -A module is a file with .py extension that contains variables, class definitions, statements and functions related to a particular task.

## Short Answer Type Questions (2-Mark)

Q1. Write the features of a module.

Ans: - 1) Modules can be reused in other programmes
2) It is independent group of code and data

Q2. Create a package ArithmeticOperations (named AO) contain sum, product and difference of two numbers and use it in your main programme.

Ans: -
```
def ADD(X,Y):
        return (X+Y)
def PRODUCT(X,Y):
        return(X*Y)
def DIFFERENCE(X,Y):
        return(X-Y)
```
Now lets save this file as AO.py then our module is created now.

Now we are creating our main python file: -
```
import AO
n1=int(input('Enter a Number'))
n2=int(input('Enter another Number'))
print('Sum = ', AO.ADD(n1,n2))
print('Difference=',AO.DIFFERENCE(n1,n2))
print('Product=',AO.PRODUCT(n1,n2))
```

## CHAPTER 5 - RECURSION

**Learning Outcomes: Understand the concept of functions and recursion.**

- **Definition**: Recursion refers to a programming technique in which function calls itself either directly or indirectly.
- Python program to find $a^b$ using recursion:

```
def power(a,b):
        if(b= =0):
                return 1
        else:
                return a*power(a,b-1)
n=int(input("enter the number: "))
p=int(input("enter the power: "))
print("Power of ",n,"to",p,"is:",power(n,p))
```
OUTPUT:
```
enter the number: 3
enter the power: 4
Power of  3 to 4 is: 81
```
- Python program to find the **factorial of a number** using recursion:

```
def factorial(n):
        if n == 1:
                return n
        else:
                return n*factorial(n-1)
num=int(input("enter the number: "))
if num < 0:
                print("Sorry, factorial does not exist for negative numbers")
elif num = = 0:
        print("The factorial of 0 is 1")
else:
        print("The factorial of  ",num,"  is  ", factorial(num))
```
**OUTPUT:**
```
enter the number: 5
The factorial of   5   is   120
```

- Python program to print the **Fibonacci series** using recursion:

```
def fibonacci(n):
        if n<=1:
                return n
        else:
                return(fibonacci(n-1)+fibonacci(n-2))

num=int(input("How many terms you want to display: "))
for i in range(num):
  print(fibonacci(i)," ", end=" ")
```

**OUTPUT**:
How many terms you want to display: 8
0 1 1 2 3 5 8 13

- **Binary Search:** It is a popular algorithm that searches the given element in minimum possible comparisons. It searches a sorted array by repeatedly dividing the search interval in half. Begin with an interval covering the whole array. If the value of the search key is less than the item in the middle of the interval, narrow the interval to the lower half. Otherwise narrow it to the upper half. Repeatedly check until the value is found or the interval is empty.

**Note:** The given array or sequence must be sorted to perform binary search.

- Python program to find an element in an array using **Binary search** recursively:

```
def binarySearch(list, beg, end, x):
        while beg<= end:
                mid = beg + (end - beg)//2;

        # Check if x is present at mid
                if list[mid] == x:
                        return mid
                  # If x is greater, ignore left half
                elif list[mid] < x:
                        beg = mid + 1

                # If x is smaller, ignore right half
                else:
                        end = mid - 1
          return -1


list = [ 2, 3, 4, 10, 40 ]
x = 10
position = binarySearch(list, 0, len(list)-1, x)
if position != -1:
        print( “Element is present at index” , position)
else:
        print (“Element is not present in list”)
```

**Very Short Answer Type Questions(1-mark)**

1. What is recursion?
Ans: Recursion refers to a programming technique in which function calls itself either directly or indirectly. ,
2. Array for binary search should be sorted or not?
Ans: Yes
3. When is recursion endless?
Ans: An infinite recursion is when recursive function calls itself endlessly.
4. Is it necessary to have a base case in a recursive function?

Ans: Yes

5. What is base case in recursion?

Ans: Preknown case of recursive function, whose solution is pre-known is called base case.

**Short Answer Type Questions(2-marks)**

1. What are the advantage and disadvantage of recursion?

Ans: Advantages of Recursion:

i. Recursive functions make the code look clean and elegant.
ii. A complex task can be broken down into simpler sub-problems using recursion.
iii. Sequence generation is easier with recursion than using some nested iteration.

Disadvantages of Recursion:

i. Sometimes the logic behind recursion is hard to follow through.
ii. Recursive calls are expensive (inefficient) as they take up a lot of memory and time.
iii. Recursive functions are hard to debug.

2. Write recursive code to compute the factorial of an integer.

Ans:

```
def calc_factorial(x):
  if x == 1:
    return 1
  else:
    return (x * calc_factorial(x-1))
num = 4
print("The factorial of", num, "is", calc_factorial(num))
```

3.Find the output:

a)

```
def out(n):
  if(n==0):
    return
  else:
    out(n-1)
    print(n)
n=6
out(n)
```

Ans:

1
2
3
4
5
6

b)

```
def sum(n):
    if(n==1):
        return 1
    return n*n+sum(n-1)
    n=4
    print("Sum is:",sum(n))
```

Ans: Sum is: 30

c)

```
def compute(a,b):
  if(b==0):
      return a
  else:
      return compute(a,a%b)
 a=6
 b=2
 c=compute(a,b)
 print("Computer data:",c)
```

Ans: Computer data: 6

## CHAPTER 6 - IDEA OF EFFICIENCY

**Learning Outcomes: Learn about the concept of efficiency in algorithms and computing in general.**

- Algorithm efficiency is related to the time taken by a program for execution and space used by the algorithm.
- Performance of algorithm depends on many internal and external factors.
- Internal Factors specify algorithm's efficiency in terms of:
  - Time required to run
  - Space required to run
- External Factors affecting algorithm efficiency are:
  - Size of the input to the algorithm

- Speed of the computer on which it is run
- Quality of the compiler

- Mainly internal factors control the algorithm's efficiency.
- Computational Complexity refers to measure the efficiency of an algorithm or program in terms of space and time.
- The program which uses minimum number of resources, less space and minimum time, is known as good program.
- Time Complexity:
  - It is the number of elementary instructions that the program executes.
  - Number depends on the size of the input data.
  - The time complexity of algorithms is most commonly expressed using the **big O notation**.
- Time Complexity of an algorithm:
  - **Best case:** The minimum number of steps that an algorithm can take for any input data values.
  - **Average case:** The efficiency averaged on all possible inputs. We normally assume the uniform distribution.
  - **Worst case:** The minimum number of steps that an algorithm can take for any input data values.
- 3 asymptotic notations are mostly used to represent time complexity of algorithms.
  - Θ (theta notation)-To denote tight bound(best case)
  - O(big oh notation)-To denote upper bound(worse case)
  - Ω(omega notation)-To denote lower bound(average casse)
- **Big O Notation:**
  - The growth rate determines the algorithm's performance when its input size grows.
  - It is the upper bound of an algorithm's performance i.e. if we say an algorithm takes $O(n^2)$ time: this means that this algorithm will carry out its task taking at most $n^2$ steps for input size n.
  - Performance of the algorithms is inversely proportional to the wall clock time. Programs with a bigger O run slower than programs with a smaller O.
- **Dominant term:** if the algorithm's performance is $an^2 + bn + c$ then we can say $an^2$ is the dominant term which has maximum impact on algorithm's performance
- **Calculating complexity(Assumption : All steps take precisely take same time to execute.)**
- Running time of loop is equal to the running time of statement inside the loop (including tests) multiplied by the number of iteration.

**1.Loops**

```
for i in range(n):
    m=m+2
```

Total time=c*n=cn  c=time taken by n steps n=no of iterations

i.e complexity is **O(n)**

**2.Nested Loops:**

```
for i in range(n):
    for j in range(n):
        L=L+1
```

Total time=c*n*n=$cn^2$

i.e complexity is **$O(n^2)$**

**3.Consecutive Statements:**

**a=a-1**

```
for i in range(n):
    m=m+2
for j in range(n):
    for k in range(n):
        b=b+1
```

Total time= $c_0+c_1*n+c_2*n*n=c_0+c_1n+c_2n^2$

i.e complexity is **$O(n^2)$**

**4.if-then-else statements:**

```
if(len(list1)!=len(list2):
    return False
else:
    for i in range(n):
```

```
        if(list1[i]!=list2[i]):
                return False
```

Total time=$c_0+c_1+(c_2+c_3)*n=c_0+c_1++(c_2+c_3)\,n$

i.e complexity is **O(n)**

**5.Logarithmic Complexity:** It means that an algorithm's performance has logarithmic factor e.g. Binary search O(log n)

- **Growth rates order:** $O(1)<O(\log n)<O(n)<O(n\log n)<O(n^2)<O(n^3)<O(2^n)$
- **Wall Clock Time :**

The wall-clock time is not the number of seconds that the process has spent on the CPU; it is the elapsed time, including time spent waiting for its turn on the CPU (while other processes get to run).

Performance of algorithm is inversely proportional to the wall clock time it records for a given input size.

| **Normal Program (Without Recursion)** | **Recursive Program** |
|---|---|
| import time<br>start=time.time( )<br>num = int(input("Enter a number: "))<br>factorial = 1<br>if num < 0:<br>  print("factorial does not exist for negative numbers")<br>elif num == 0:<br>  print("The factorial of 0 is 1")<br>else:<br>  for i in range(1, num + 1):<br>  factorial = factorial*i<br>print("The factorial of",num,"is",factorial)<br>end=time.time()<br>t=end-start<br>print("Total time taken: ", t)<br>OUTPUT:<br>Enter a number: 5<br>The factorial of 5 is 120<br>Total time taken:  5.615321159362793 | import time<br>def factorial(n):<br>  if n == 1:<br>  return n<br>  else:<br>  return n*factorial(n-1)<br>start=time.time()<br>num=int(input("enter the number: "))<br>if num < 0:<br>  print("factorial does not exist for negative numbers")<br>elif num==0:<br>  print("The factorial of 0 is 1")<br>else:<br>  print("The factorial of  ",num,"  is  ", factorial(num))<br>end=time.time()<br>t=end-start<br>print("Total time taken: ", t)<br>OUTPUT:<br>enter the number: 5<br>The factorial of  5  is  120<br>Total time taken:  2.149122714996338 |

- Recursive program is taking less time than without recursion program. So, Program with recursion is efficient. Therefore, we can conclude that Performance of algorithm is inversely proportional to the wall clock time.

**<u>Very Short Answer Type Questions(1-mark)</u>**

1. What is algorithm?

Ans: It is a step by step process to solve a problem.

2. What is Algorithm efficiency?

Ans: Algorithm efficiency is related to the time taken by a program for execution and space used by the algorithm.

3. Define Big 'O' notation.

Ans: It is the upper bound of an algorithm's performance i.e. if we say an algorithm takes $O(n^2)$ time: this means that this algorithm will carry out its task taking at most $n^2$ steps for input size n.

4. Which factors affect an algorithm's performance?

Ans: Time and space.

5. Which complexity is more O(n) or O(log n)?

And: O(n)

6. Is linear search or binary search faster?

Ans: Binary search

7. What is worst case in terms of algorithms?

Ans: The input that makes a given algorithm run slowest.

8. What is the best case in terms of algorithms?
Ans: The input that makes a given algorithm run fastest.

**Short Answer Type Questions(2-marks)**

1. Reorder the following efficiencies from smallest to largest:
a)10000 b)n! c) $n^2$ d)nlogn
Ans: 10000<nlogn<$n^2$ <n!
2. Name the Internal Factors that affects algorithm's efficiency.
Ans: Internal Factors specify algorithm's efficiency in terms of:
- Time required to run
- Space required to run

3. Name the External Factors that affects algorithm's efficiency.
Ans: External Factors affecting algorithm efficiency are:
- Size of the input to the algorithm
- Speed of the computer on which it is run
- Quality of the compiler

4. What is the time complexity of binary search?
Ans: O(log n)

5. Determine the complexity:

a)
```
n=int(input("Enter the number to check"))
flag=0
for i in range(2,n):
   if n%i==0:
      flag=1
      break
if flag:
   print(n,"is Not a prime number")
else:
   print(n," is  prime number")
```
Ans: O(n)

b)
```
n=int(input("Enter the number to check"))
flag=1
i=2
while(i*i<=n):
   if n%i==0:
      flag=0
      break
   i=i+1
if flag:
   print(n,"is Not a prime number")
else:
   print(n," is  prime number")
```
Ans: O(√n)

c)
```
for i in range(n):
  a=i+i+2
 print(a)
for j in range(m):
  b=b*4
  print(b)
```
Ans: O(n+m)

d)
```
for i in range(n):
  for j in range(n):
    a=i+j
    print(a)
for k in range(n):
  print(k)
```
Ans: O($n^2$)

6. Write two suggestions that can be useful in designing algorithms.
Ans: (i) Redundant computations or unnecessary use of storage should be avoided.
(ii) Inefficiency due to late termination should be taken care of.
7. Given the following array, which search will find the value 18 in least steps?
3 10 18 22 35
Ans: Binary search
8. Given the following array, which search will find the value 3 in least steps?
3 10 18 22 35
Ans: Linear search
9. Calculate the run-time efficiency of the following program segment:
```
i=1
while i<=n:
        j=1
```

```
        while j<=n:
            k=1
            while k<=n:
                print(i,j,k)
                k=k+1
            j=j+1
        i=i+1
```

Ans: $O(n^3)$

10. a)What is the worst case complexity of the following code fragment?

```
for x in range(a):
        statements
for y in range(b):
        for z in range( c) :
            statements
```

b) How would the complexity would change if a,b,c are replaced by n?

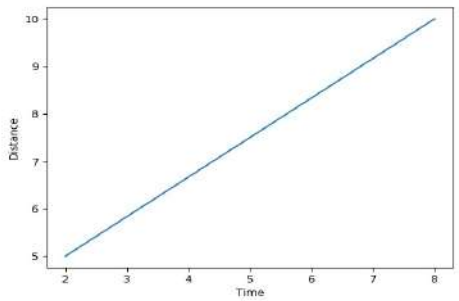
Ans: a) O(a+bc)b)$O(n^2)$

## CHAPTER 7 - DATA VISUALIZATION USING PYPLOT

- Data visualization basically refers to the graphical or visual representation of information and data using charts, graphs, maps
- Data visualization helps for better understanding of the meaning of data.
- pyplot is a collection of methods which exists in matplotlib library.
- Pyplot allow user to construct 2D plots easily and interactively.
- **To install the matplotlib :**
  pip install matplotlib
- **Commonly used chart types:**
  - Line Chart
  - Bar Chart
  - Pie Chart
- **Line Chart:** A line chart displays information as a series of data points called “markers”.
- Pyplot provides plot() function to create line graph
- To set the lables for x-axis and y-axis, xlabel( ) and ylabel( ) functions are used.
- Use show( ) function to display the line.
- **Python program to draw a line graph for a list of values:**

```
import matplotlib.pyplot as pl          #pl is alias for matplot.pyplot
x=[2, 8]            # values of x1 and x2
y=[5, 10]           #values of y1 and y2
pl.plot(x,y)        # to create a line
pl.xlabel("Time")           #label name for x-axis
pl.ylabel("Distance")       #label name for y-axis
pl.show()                   #to show the line
```

**Output:**



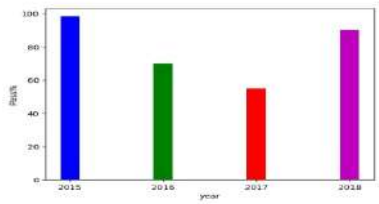
- **Change the line color** : Syntax

matplotlib.pyplot.plot(data1, data2, color-code) *Example:*
matplotlib.pyplot.plot(x, y, '**r**')  #'r' is color code for red colour

- **Bar Chart:** A bar chart is a graphical display of data using bars of different heights.
- Pyplot provides bar() function to create bar graph
- Python program *t*o display the year-wise result of a school using **bar chart.**

```
import matplotlib.pyplot as pl
year=['2015','2016','2017','2018']    # list of years
p=[98.50,70.25,55.20,90.5]          #list of pass percentage
c=['b','g','r','m']                 # color code of bar charts
pl.bar(year, p, width=0.2, color=c)  # bar( ) function to create the bar chart
pl.xlabel("year")                   # label for x-axis
pl.ylabel("Pass%")                  # label for y-axis
pl.show( )                          # function to display bar chart
```

**OUTPUT:**

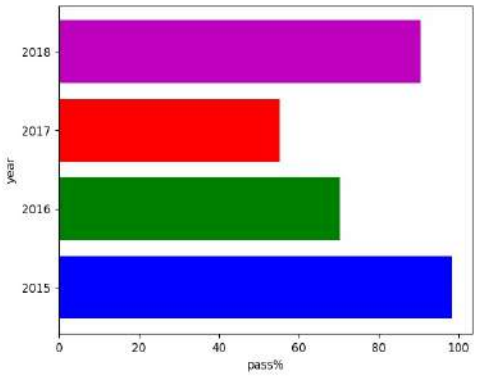



- The **bar( )** function has ***width*** argument to set the width of all bars. It has ***color*** argument also, to change the color of bars.
- **Creating a horizontal bar chart:** For this we can use **barh( )** function (bar horizontal). Swap the names of axis labels.

**Example:**

```
import matplotlib.pyplot as pl
year=['2015','2016','2017','2018']
p=[98.50,70.25,55.20,90.5]
c=['b','g','r','m']
pl.barh(year, p, color = c)
pl.xlabel("pass%")
pl.ylabel("year")
pl.show( )
```

**OUTPUT:**



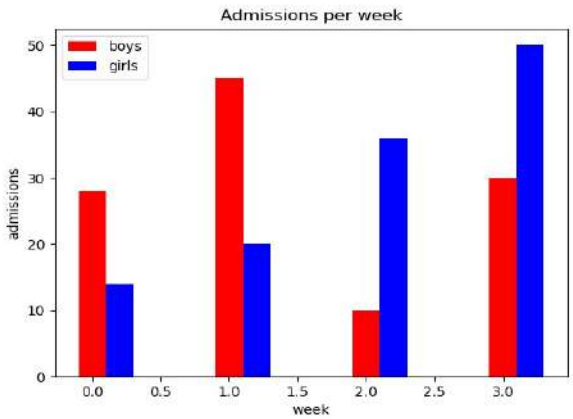

- **Multiple Bar Charts:**

***Program:***

```
import matplotlib.pyplot as pl
import numpy as np        # importing numeric python for arange( )
boy=[28,45,10,30]
```

```
girl=[14,20,36,50]
X=np.arange(4)                # creates a list of 4 values [0,1,2,3]
pl.bar(X, boy, width=0.2, color='r', label="boys")
pl.bar(X+0.2, girl, width=0.2,color='b',label="girls")
pl.legend(loc="upper left")    # color or mark linked to specific data range plotted at location
pl.title("Admissions per week")              # title of the chart
pl.xlabel("week")
pl.ylabel("admissions")
pl.show( )
```

**OUTPUT:**




- **Pie Chart:** A pie chart is a circular representation of data in the form of sectors.
- pyplot interface has **pie( )**function to create a pie chart.
- **Example:**

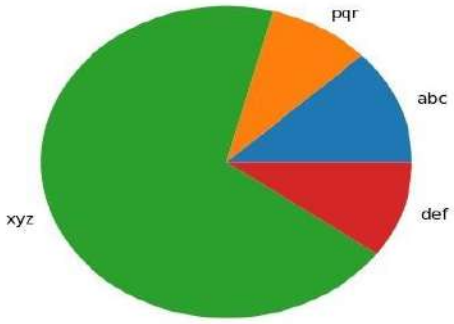
```
import matplotlib.pyplot as pl
part=[12,9,69,10]
explode=(0.1,0,0,0)
pl.pie(part,explode=explode)
pl.show( )
```

- **Add Labels to slices of pie chart:**

To display labels of pie chart, **pie**( ) function has **labels** argument.

**Example:**

```
import matplotlib.pyplot as pl
part=[12,9,69,10]
pl.pie(part, labels=['abc','pqr','xyz','def'])
pl.show( )
```

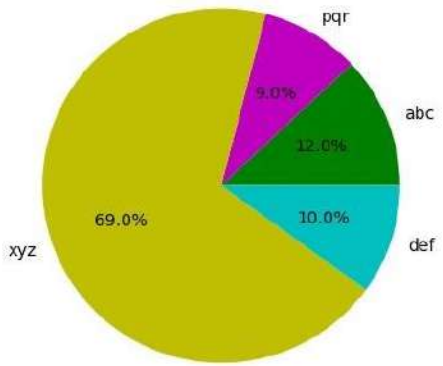



- **Change the color of slices:** Add ***colors*** argument to pie( ) function.

**Example:**

```
import matplotlib.pyplot as pl
part=[12,9,69,10]
clr=['g','m','y','c']        # list of colors
pl.pie(part, colors=clr, labels=['abc','pqr','xyz','def'], autopct='%1.1f%%')   # adding colors
pl.show( )
```

**OUTPUT:**




**Very Short Answer Type Questions(1-mark)**

1.What is visualization of Data? How to use Pyplot for it?
Ans. Data visualization is the discipline of trying to understand data by placing it in a visual context so that patterns, trends and correlations that might not otherwise be detected can be exposed.
2. Which packages of Python is use to draw 2-D graphics?
Ans. Matplotlib
3. Which function is to be use for draw a line in Pyplot Python?
Ans: plot()
4. Name the interface of matplotlib used for drawing 2-D graphs.
Ans: pyplot
5. Which function is to be use for draw bar chart in Pyplot Python?
Ans: bar()
6. Which function is to be use for draw pie chart in Pyplot Python?
Ans: pie()
7. Which function is used to add title to plot?
Ans: title()
8. Which function is used to label axes in a plot?
Ans: xlabel() and ylabel()
9. What is bar chart?
Ans: Bar chart is a graphical display of dat using bars of different heights.
10. What is pie chart?
Ans: Pie chart is a type of graph in which circle is divided into sectors that represent proportion of the whole.

**Short Answer Type Questions(2-marks)**

1. How to use Pyplot for visualization of Data?
Ans:

```
import matplotlib.pyplot as plt
x=[1,2,3,4]
y=[20,30,40,50]
plt.plot(x, y)
plt.show()
```

2. What is line graph? Write the python code for line graph.
Ans: Line chart is a type of chart which displays information as a series of data points called markers connected by straight line segments.

```
import matplotlib.pyplot as plt
p1 = [1,20]
p2 = [6,70]
plt.plot(x, y)
plt.show()
```

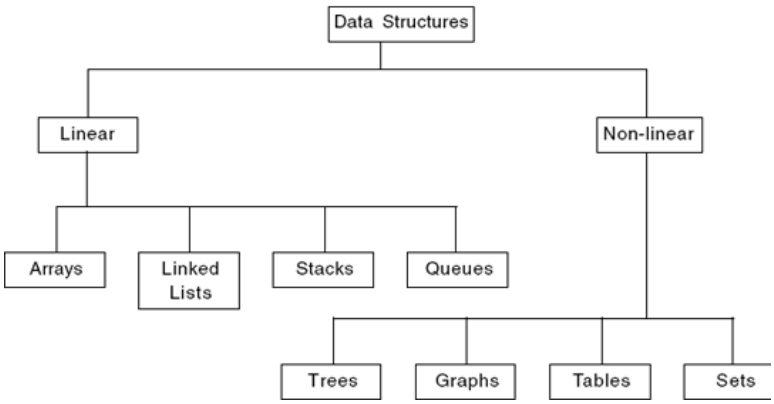
3. Why is following code giving error?
Ans: a=range(1,10,2)
b=range(10,100,10)

matplotlib.pyplot.plot(a,b)
Ans: the above code is producing error because two sequences a and b do not match in shape. List a is having 5 values and b list is having 9 values.
4. Write the python code to plot bar chart for sales in different cities.
Ans: import matplotlib.pyplot as plt
p1 = ['Agra','Delhi','Kolkata','Chennai']
p2 = [10,23,19,26]
plt.xlabel('Cities')
plt.ylabel('Sales figure in Lakhs')
plt.bar(p1,p2)
plt.show()
5. Write the python program to create line chart for 10x+4.
Ans:import matplotlib.pyplot as plt
X=[1,2,3,4]
Y=10*X+4
plt.plot(X, Y)
plt.show()
6. Write the python program to create bar plot for class and its strength.
Ans: import matplotlib.pyplot as plt
C=['X','XI','XII']
S=[160,152,136]
plt.xlabel('Classes')
plt.ylabel('Strength')
plt.bar(C,S)
plt.show()
7. Write the python program to plot pie chart of popular languages among students.
Ans: import matplotlib.pyplot as plt
Labels=['.Net','Python','C++',Java']
Sizes=[190,250,200,230]
plt.pie(Sizes,labels=Labels)
plt.show()
8. Write the python program to plot pie chart for share=[17.4,25,5.2,35.2] and Zones=['North','South','East','West'].
Ans: import matplotlib.pyplot as plt
share=[17.4,25,5.2,35.2]
Zones=['North','South','East','West']
plt.pie(share,labels=Zones)
plt.show()
9.Write the python program to plot pie chart for share=[29,30,21,13,7] and stream=['SCIENCE','HUMANITIES','COMMERCE','VOCATIONAL,'FMM'].
Ans: import matplotlib.pyplot as plt
share=[29,30,21,13,7]
stream=['SCIENCE','HUMANITIES','COMMERCE','VOCATIONAL,'FMM'].
plt.pie(share,labels=stream)
plt.show()

# CHAPTER 8 - DATA-STRUCTURES

**Learning Outcomes: Learn basic data structures: lists, stacks, and queues.**

- The logical or mathematical model of a particular organization of data is called data structure. It is a way of storing, accessing, manipulating data.
- **Types of data structure:**




- **Operation on data structure:**
  - **Traversing**: Accessing each record exactly once.
  - **Insertion**: Adding a new element to the structure.
  - **Deletion**: Removing element from the structure.
  - **Searching**: Search the element in a structure.
  - **Sorting**: Arrange the elements in ascending and descending order.
  - **Merging**: Joining two data structures of same type.
- **List:** An array or list is the collection of elements in ordered way.
- There are two types of arrays:
  - One dimensional list (1-D Lists)
  - Multi-dimensional list (Nested Lists)
- **Traversing 1-D array (List):**

```
L=[10,20,30,40,50]
n=len(L)
for i in range(n):
    print(L[i])
```

**Output:**

```
10
20
30
40
50
```

- **Inserting Element in a list:** There are two ways to insert an element in a list:
  - If the array is not sorted
  - If the array is sorted
- **If the array is not sorted**: In this case, enter the element at any position using insert( ) function or add the element in the last of the array using append( ) function.

**Example**:

```
L=[15,8,25,45,13,19]
L.insert(3, 88)          # insert element at the index 3 print(L)
```

**Output:**

```
[15, 8, 25, 88, 45, 13, 19]
```

- **If the array is sorted**: In this case, import bisect module and use the functions bisect( ) and insort( ). bisect( ) : identifies the correct index for the element and returns the index. insort( ): Inserts the element in the list in its correct order.
- **Deletion of an element from a List:** To delete an element from a list we can use remove( ) or pop( ) method.

**Example:**

```
L=[10,15,35,12,38,74,12]
print("List Before deletion of element: ", L)
val=int(input("Enter the element that you want to delete: "))
```

```
L.remove(val)
print("After deletion the element", val,"the list is: ", L)
```

**OUTPUT:**

```
List Before deletion of element:  [10, 15, 35, 12, 38, 74, 12]
Enter the element that you want to delete: 12
After deletion the element 12 the list is:  [10, 15, 35, 38, 74, 12]
```

- **Searching in a List:** There are two types of searching techniques we can use to search an element in a list. These are:
  - Linear Search
  - Binary Search

**(i) Linear Search:** It is a simple searching technique.

**Program:**

```
L=eval(input("Enter the elements: "))
n=len(L)
item=eval(input("Enter the element that you want to search : "))
for i in range(n):
        if L[i]==item:
                print("Element found at the position :", i+1)
                break
        else:
                print("Element not Found")
```

**Output:**

```
Enter the elements: 56,78,98,23,11,77,44,23,65
Enter the element that you want to search : 23
Element found at the position : 4
```

**(ii) Binary Search:** (Theory already discussed in the chapter recursion).

**Program:**

```
def BinarySearch(LIST,n,item):
  LB=0
  UB=n-1
  while LB<=UB:
    mid=int((LB+UB)/2)
    if item<LIST[mid]:
      UB=mid-1
    elif item>LIST[mid]:
      LB=mid+1
    else:
      return mid
  else:
    return -1
L=eval(input("Enter the elements in sorted order: "))
size=len(L)
element=int(input("Enter the element that you want to search :"))
found=BinarySearch(L,size,element)
if found>=0:
  print(element, "Found at the position : ",found+1)
else:
  print("Element not present in the list")
```

**OUTPUT:**

```
Enter the elements in sorted order: [1,2,3,4]
Enter the element that you want to search :3
3 Found at the position :  3
```

| Linear Search | Binary Search |
|---|---|
| Access of elements sequentially. | Access of elements randomly. |
| Elements may or may not be in sorted order. | Elements must be in sorted order i.e. ascending or descending order |
| Takes more time to search an element. | Takes less time to search an element. |
| easy | tricky |
| Efficient for small array. | Efficient for larger array |

- **Sorting:** To arrange the elements in ascending or descending order. There are many sorting techniques.

**Program:**

```
L=eval(input("Enter the elements:"))
n=len(L)
for p in range(0,n-1):
   for i in range(0,n-1):
      if L[i]>L[i+1]:
         L[i], L[i+1] = L[i+1],L[i]
print("The sorted list is : ", L)
```

**OUTPUT:**

Enter the elements:[60, 24, 8, 90, 45, 87, 12, 77]
The sorted list is :  [8, 12, 24, 45, 60, 77, 87, 90]

- **Stack**:It is a linear data structure.
- Stack is a list of elements in which an element may be inserted or deleted only at one end, called the **TOP** of the stack.
- It follows the principle **Last In First Out** (LIFO).
- There are two basic operations associated with stack:
  - **Push** : Insert the element in stack
  - **Pop** : Delete the element from stack
- **Menu based programme for stack:**

```
S=[]
from os import system
#menu display
def menu():
        ch=0
        while(ch<1 or ch>4):
                #print ("\n"*100)
                anyvar=system('cls')
                print ("\n\n\n\n\n")
                print ("\t\t\t1: PUSH")
                print ("\t\t\t2: POP")
                print ("\t\t\t3: DISPLAY")
                print ("\t\t\t4: EXIT")
                ch=int(input("\n\t\t\tEnter a choise (1-4):"))
        return ch
def push():
        #code to push an item
        item=int(input("\t\t\tEnter an item to push: "))
        S.append(item)
        print ("\t\t\tITEM " , item ," PUSHESD IN THE STACK")
def pop():
        #code to pop from stack
   if (S==[]):
      print ("\t\t\tNO ITEM TO POP")
```

```
    else:
        item=S.pop()
        print ("\t\t\tITEM " , item ," POPPED FROM THE STACK")
def display():
    #code to display stack
    if (S==[]):
        print ("\t\t\tEMPTY STACK")
    else:
        print ("\t\t\t",)
        for i in S:
            print( i ,' ',end="")
#code to call all functions
import sys
ch=0
while(ch!=4):
    ch=menu()
    if(ch==1):
        push()
    elif(ch==2):
        pop()
    elif(ch==3):
        display()
    elif(ch==4):
        print ("\t\t\tABORTING PROGRAM.....")
        sys.exit()
        anyvar=input("\n\t\t\tPress any key to continue...\n")
```

- **QUEUE:**Queue is a linear data structure. Queue is a list of elements in which insertion takes place at one end, called the **REAR** and deletion takes place only at the other end, called the **FRONT**.
- It follows the principle **First In First Out** (FIFO).
- There are two basic operations associated with stack:
    - **Enqueue** : Insert the element in queue
    - **Dequeue** : Delete the element from queue
- **Menu based programme for queue:**

```
Q=[]
from os import system
#menu display
def menu():
    ch=0
    while(ch<1 or ch>4):
        #print ("\n"*100)
        anyvar=system('cls')
        print ("\n\n\n\n\n")
        print ("\t\t\t1: INSERT")
        print ("\t\t\t2: DELETE")
        print ("\t\t\t3: DISPLAY")
        print ("\t\t\t4: EXIT")
        ch=int(input("\n\t\t\tEnter a choise (1-4):"))
        return ch
def insert():
    #code to insert an item
    item=int(input("\t\t\tEnter an item to insert: "))
    Q.append(item)
```

```
    print ("\t\t\tITEM " , item ," INSERTED IN THE QUEUE")
def delete():
    #code to delete from queue
    if (Q==[]):
        print ("\t\t\tNO ITEM TO DELETE")
    else:
        item=Q.pop(0)
        print ("\t\t\tITEM " , item ," DELETED FROM THE QUEUE")
def display():
    #code to display stack
    if (Q==[]):
        print ("\t\t\tEMPTY QUEUE")
    else:
        print ("\t\t\t",)
        for i in Q:
            print (i ,' ', end=" ")

#code to call all functions
import sys
ch=0
while(ch!=4):
    ch=menu()
    if(ch==1):
        insert()
    elif(ch==2):
        delete()
    elif(ch==3):
        display()
    elif(ch==4):
        print ("\t\t\tABORTING PROGRAM.....")
        sys.exit()
        anyvar=input("\n\t\t\tPress any key to continue...\n")
```

**Very Short Answer Type Questions(1-mark)**

1. What do you mean by Data Structure?
Ans: Data Structure means organization of data. A data structure has well defined operations or behavior.
2. FIFO data structure is?
Ans: QUEUE
3. LIFO data structure is?
Ans: STACK
4. Can we have nested list?
Ans: Yes
5. Name one linear data structure.
Ans: Lists
6. Name one non-linear data structure.
Ans: Graphs
7. Name the operation for insertion in a stack.
Ans: PUSH
8. Name the operation for deletion from a stack.
Ans: POP
9. Name the function to find length of a list.
Ans: len( )
10. Indexing in list starts from ?
Ans: 0

## Short Answer Type Questions(2-marks)

1. How is Data Structure different from Data Type?
Ans: Data Structure provides information regarding organization of data whereas Data Type provides information regarding the domain of values and operations that can be perform on data.
2. Define Stack and Queue
Ans: Stack – A stack is a linear list also known as LIFO list with the special property that items can be added or removed from only one end called the top.
Queue – A queue is a linear list also known as FIFO list with the special property that items can be added added at one end and removed from the other.
3. Name some operations commonly performed on data structures?
Ans: Traversal, Insertion, Deletion, Searching, Sorting, Merging etc.
4. What is a list?
Ans: A list is a mutable sequence of data elements indexed by their position. A list is represented using [ ] . e.g L=[10,20,30]
5. What is traversing? Write python code to traverse a list.
Ans: Traversing means accessing or visiting or processing each element of any data structure.

```
L=[10,20,30,40,50]
for x in L :
        print(x)
```

6. Name the methods used for inserting and deleting elements from a list.
Ans: Various methods for inserting elements in a list are - insert(), append(), extend() and methods used for deleting items from a list are – pop() , remove(), clear()
7. Write some applications of stack.
Ans: Reversing a string, compilers uses stack to store previous state of program, undo mechanism in text editors and backtracking.
8. Write some applications of queue.
Ans: Sharing of resources, CPU uses queue, Airport authorities uses queue for runways and many computer algorithms uses queue.
9. Describe similarities between stack and queue.
Ans: i)Both are special cases of linear list
ii) Both can be implemented as list.
10. Describe differences between stack and queue.
Ans: i) A Stack is LIFO and Queue is FIFO
ii) Queue can be circular whereas Stack cannot.

## Application based Short Answer Type Questions(2-marks)

1. Predict the output with respect to the list L=[40,20,30,10,50]

| | |
|---|---|
| (a) print(L) | Ans: [40, 20, 30, 10, 50] |
| (b) print(len(L)) | Ans: 5 |
| (c) L.pop() ; print(L) | Ans:50<br>[40, 20, 30, 10] |
| (d L.append(70); print(L) | Ans: [40, 20, 30, 10, 70] |
| (e) L.sort(); print(L) | Ans: [10, 20, 30, 40, 70] |

2. Find the output:

| | |
|---|---|
| (a)secondlist=[1,2,3,[4,5,[6,7,8],9],10,11]<br>print(len(secondlist) ) | Ans: 6 |
| (b) L=[1, 2, 3, [4, 5, [ 6, 7, 8 ], 9 ] ,10, 11]<br>L[1] | Ans: 2 |
| (c) L[3] | Ans:[4, 5, [6, 7, 8], 9] |
| (d) L[3][1] | Ans:5 |
| (e)L[3][2][0] | Ans:6 |
| (f)L[3][2] | Ans: [6, 7, 8] |
| (g)L[3][2][1] | Ans:7 |
| (h)L[3][3] | Ans:9 |

3.Predict the output:
(a)b=[[9,6],[4,5],[7,7]]
(b) b=[[9,6],[4,5],[7,7]]

```
X=b[:2]
X.append(10)
print(X)
Ans: [[9, 6], [4, 5], 10]
```

```
X=b[:2]
X[1].append(10)
print(X)
Ans: [[9, 6], [4, 5, 10]]
```

4. Consider STACK=['a','b','c','d']. Write the STACK content after each operations:

| | |
|---|---|
| a) STACK.pop( ) | Ans: ['a', 'b', 'c'] |
| b)STACK.append('e') | Ans: ['a', 'b', 'c','e'] |
| c) STACK.append('f') | Ans: ['a', 'b', 'c','e','f'] |
| d) STACK.pop( ) | Ans: ['a', 'b', 'c','e'] |

5. Write a program to implement a stack for the students(studentno, name). Just implement Push.

Ans: Program for push operation in a stack

```
stk=[]
top=-1
def PUSH(stk,student):
        stk.append(student)
        top=len(stk)-1
sno=int(input("Enter student No:")
sn=input("Enter student Name:")
data=[sno,sn]
PUSH(stk,data)
```

6. Write a program to implement a stack for the students(studentno, name). Just implement Pop and display.

Ans: Program for push operation in a stack

```
stk=[]
top=-1
def POP():
        if(top==-1):
                print("NO STUDENT DATA")
        else:
                print("Student details are:", stk.pop())
                top=len(stk)-1
def display():
        if(top==-1):
                print("NO STUDENT DATA")
        else:
                t=len(stk)-1
                print(stk[t])
                for i in range(t-1,-1,-1):
                        print(stk[i])
display()
POP()
```

7. Write a python program to perform insert in a queue containing books details(bno,bname).

Ans: queue=[]

```
def Enqueue(q,book):
        queue.append(q)
bno=int(input("Enter book No:")
bn=input("Enter book Name:")
books=[bno,bn]
Enqueue(queue,books)
```

8. Write a python program to perform deletion from a queue containing books details(bno,bname).

Ans: queue=[]

```
front=None
def Enqueue(q,book):
        if(isEmpty(queue)):
```

```
            print("UNDERFLOW")
    else:
            print("Book is ", q.pop(0))
```

9. If L=["Python", "is", "a", ["modern", "programming"], "language", "that", "we", "use"] , then find the output:

| | |
|---|---|
| a) L[0][0] | Ans: 'P' |
| b) L[3][0][2] | Ans: 'd' |
| c) L[3:4][0] | Ans: ['modern', 'programming'] |
| d) L[3:4][0][1] | Ans: 'programming' |
| e) L[3:4][0][1][3] | Ans: 'g' |
| f) L[0:9][0] | Ans: 'Python' |
| g) L[0:9][0][3] | Ans: 'h' |
| h) L[3:4][1] | Ans: IndexError: list index out of range |

10. Given a bounded stack of capacity 4 which is initially empty, write the stack content after each steps:

| | |
|---|---|
| a) Push '1'<br>stack=['1']<br>b) Push '2'<br>stack=['1','2']<br>c) Push '3'<br>stack=['1','2','3']<br>d) Push '4'<br>stack=['1','2','3','4']<br>e) Pop<br>stack=['1','2','3'] | f) Pop<br>stack=['1','2']<br>g) Push('5')<br>stack=['1','2','5']<br>h)Pop<br>stack=['1','2']<br>i)Pop<br>stack=['1']<br>j)Pop<br>stack=[] |

11. Evaluate the following Postfix expression: 4,10,5,+,*,15,3,/,-

Ans: 55

12. What is the difference between pop() and pop(0)?

Ans: pop() will delete the last element of a list whereas pop(0) will delete element at index zero of a list.

# UNIT 2 COMPUTER NETWORKS

## CHAPTER 9: COMPUTER NETWORK

1. **Learning Outcome as per cbse**

Get a basic understanding of computer networks: network stack, basic network hardware, basic protocols, and basic tools

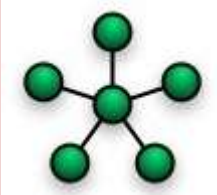
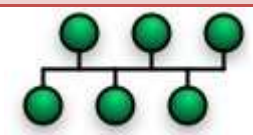
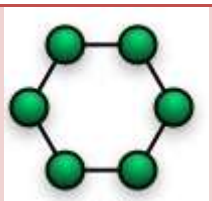
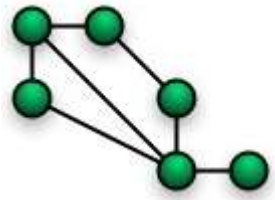
- **Network**

A Network is a collection of interconnected autonomous computers. A computer which is a part of a network is known as Node or Workstation. The benefits of a network are resource sharing, increased reliability, cost reduction and effective communication.

**Structure of a network**

- **Topology**

It is termed as the physical arrangement of computers in a network. There are different types of network topologies such as Bus topology, Ring topology, Star topology, Tree topology, Mesh topology.

| Type of topology | Figure | Advantage | Disadvantage |
|---|---|---|---|
| **Star Topology** |  | • Easy to install, easy to configure<br>• If one link fails the network can still function | • If the central server fails, whole network fails |
| **Bus topology** |  | • Easy to set up, handle, and implement.<br>• It is best-suited for small networks | • Not easy to isolate faults in the network nodes |
| **Ring topology** |  | • Easy to install<br>• Easy to reconfigure | • Failure of single node cause the entire network to fail. |
| **Mesh topology** |  | • Transmit data from one node to many other nodes at the same time<br>• If one link breaks, the rest of the network is still functional | • A lot of cables are needed |

- **Types of Network**

LAN (Local Area Network) 2. MAN (Metropolitan Area Network 3. WAN(Wide Area Network)
4. PAN (Personal Area Network)

| LAN | WAN |
|---|---|
| It spread over a small area | It spread over a very large area |

| | |
|---|---|
| Less cost to set up | Higher cost to set up |
| It is usually a single network | It is usually a network of many networks |

**New Technologies**

- **Cloud computing**

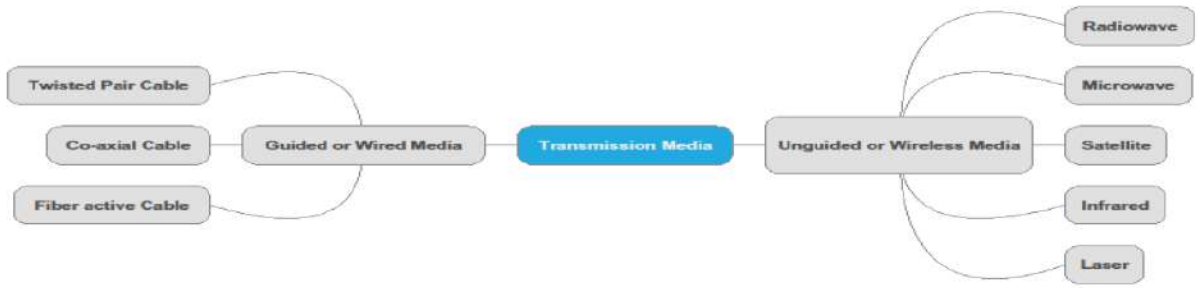
It is internet-based computing, where shared resources, software and information are provided to computers and other devices on demand

| Type of cloud | Description |
|---|---|
| Private cloud | • A private cloud consists of computing resources used exclusively owned by one business or organization.<br>• It is not publicly accessible and is owned by a single organization and its authorized external partners. |
| Public cloud | • It refers to the common cloud service made available to multiple subscribers.<br>• The cloud resources are owned and operated by a third-party cloud service provider and delivered over internet. |

- **Internet of things (IoT)**

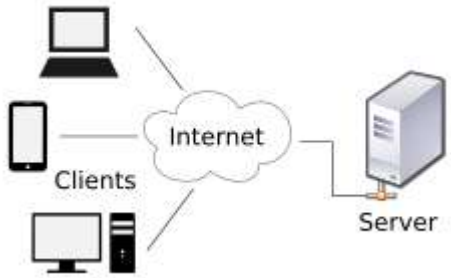
It is a phenomenon that connects the things to the Internet over wired or wireless connection.
Eg: IoT devics: Home appliances (Refrigerator, water heater), smart homes (smart door locks, smart bulbs) etc

**Wired and wireless networks**




| Specification | Wired network | Wireless network |
|---|---|---|
| **Installation** | Hard to install, requires more time | easy installation and need less time |
| **Mobility** | Limited | Not limited |
| **Transmission medium** | copper wires, optical fiber cables | Radio waves or infrared |
| **Cost** | Less as cables are not expensive | More costly wireless routers/access points/ adapters are expensive |

**Concept of a client and server**




Networks in which certain computers have special dedicated tasks, providing services to other computers (in the network) are called client server networks. The computer(s) which provide services are called servers and the ones that use these services are called clients.

**Network devices**

- **NIC**: An NIC (network interface card) is a computer hardware designed to allow computers to communicate over a network. Each NIC card has assigned a unique physical address known as MAC address.
  **Eg**: MAC address: 10:B5:03:63:2E:FC
- **Hub**: It is a hardware device used to connect several computers together. A hub contains multiple ports. When a packet arrives at one port, it is copied to all the ports of the hub (i.e. in broadcast manner).
- **Switch**: It is a device used to segment network into different sub networks called subnets or LAN segments. The main advantage is it prevents traffic overloading in a network. It is distinct from a hub that it only forwards the data to the ports involved in the communications rather than all ports.
- **Access point (Wireless access point)**: It is a hardware device that establishes connection of computing devices on wireless LAN with a fixed wire network.

| Bridges | Routers | Gateways |
|---|---|---|
| Similar topology and similar protocol | Similar topology and different protocol | Different topology and different protocol |

**Questions (Case study based questions -4 marks)**

**Q1.**Ayurveda Training Educational Institute is setting up its centre in Hyderabad with four specialised departments for Orthopedics, Neurology and Pediatrics along with an administrative office in separate buildings. The physical distances between these department buildings and the number of computers to be installed in these departments and administrative office are given as follows. You, as a network expert, have to answer the queries as raised by them in (i) to (iv).

Shortest distances between various locations in metres :

| | |
|---|---|
| Administrative Office to Orthopedics Unit | 55 |
| Neurology Unit to Administrative Office | 30 |
| Orthopedics Unit to Neurology Unit | 70 |
| Pediatrics Unit to Neurology Unit | 50 |
| Pediatrics Unit to Administrative Office | 40 |
| Pediatrics Unit to Orthopedics Unit | 110 |

Number of Computers installed at various locations are as follows :

| | |
|---|---|
| Pediatrics Unit | 40 |
| Administrative Office | 140 |
| Neurology | 50 |
| Orthopedics Unit | 80 |

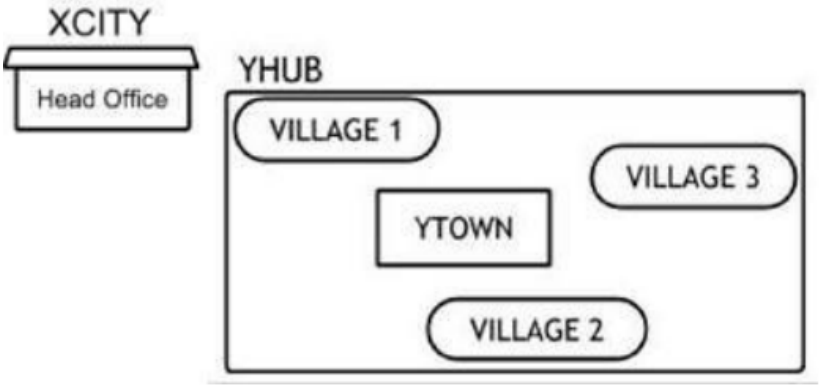
i. Suggest the most suitable location to install the main server of this institution to get efficient connectivity.
Ans. Administrative Office

ii. Suggest the best cable layout for effective network connectivity of the building having server with all the other buildings.
Ans: Administrative Office is connected to Orthopedic, Radiology, Pediatrics units directly in a Star Topology

iii. Suggest the devices to be installed in each of these buildings for connecting computers installed within the building out of the following : Gateway, switch, Modem
Ans: Switch

iv. Suggest the topology of the network and network cable for efficiently connecting each computer installed in each of the buildings out of the following :
Topologies: Bus Topology, Star Topology
Network Cable: Single Pair Telephone Cable, Coaxial Cable, Ethernet Cable.
Ans: Topology: Star Topology
Network Cable: Ethernet Cable / Coaxial Cable

**Q2**. Intelligent Hub India is a knowledge community aimed to uplift the standard of skills and knowledge in the society. It is planning to setup its training centers in multiple towns and villages pan India with its head offices in the nearest cities. They have created a model of their network with a city, a town and 3 villages as follows. As a network consultant, you have to suggest the best network related solutions for their issues/problems raised in (i) to (iv), keeping in mind the distances between various locations and other given parameters.




Shortest distances between various locations:

| | |
|---|---|
| VILLAGE 1 to YTOWN | 2 KM |
| VILLAGE 2 to YTOWN | 1.5 KM |
| VILLAGE 3 to YTOWN | 3 KM |
| VILLAGE 1 to YTOWN 2 | 3.5 KM |
| VILLAGE 1 to YTOWN 3 | 4.5 KM |
| VILLAGE 1 to YTOWN 3 | 3.5 KM |
| CITY Head Office to YHUB | 30 KM |

Number of Computers installed at various locations are as follows:

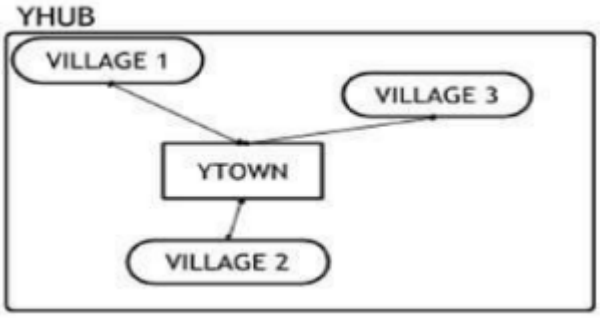
| | |
|---|---|
| YTOWN | 100 |
| VILLAGE 1 | 10 |
| VILLAGE 2 | 15 |
| VILLAGE 3 | 15 |
| CITY OFFICE | 5 |

In Villages, there are community centers, in which one room has been given as training center to this organization to install computers. The organization has got financial support from the government and top IT companies.

i. Suggest the most appropriate location of the SERVER in the YHUB (out of the 4 locations), to get the best and effective connectivity. Justify your answer.
Ans: YTOWN. Because it has the maximum number of computers and it is closest to all other locations.

ii. Suggest the best wired medium and draw the cable layout (location to location) to efficiently connect various locations within the YHUB.

Ans: Optical fiber




iii. Which hardware device will you suggest to connect all the computers within each location of YHUB?
Ans: Switch OR Hub

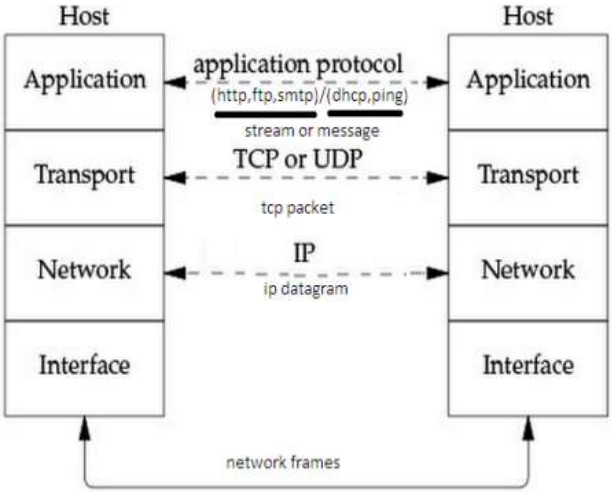
iv. Which service/protocol will be most helpful to conduct live interactions of Experts from Head Office and people at YHUB locations?
Ans: Videoconferencing OR VoIP

**Short answer questions**

Q1. Define network?
Q2. Differentiate LAN and WAN?
Q3. Explain the working of client server architecture?
Q4. Define IoT?
Q5. List out some examples for Iot devices?
Q6. Differentiate public and private cloud?
Q7. What is the unique identification number of NIC card?
Q8. Define topology?
Q9. Differentiate switch and gateway?
Q10. List some advantage of ring topology.

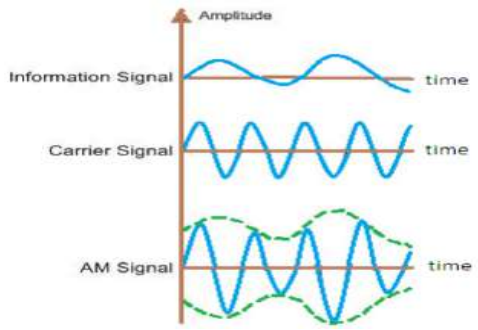
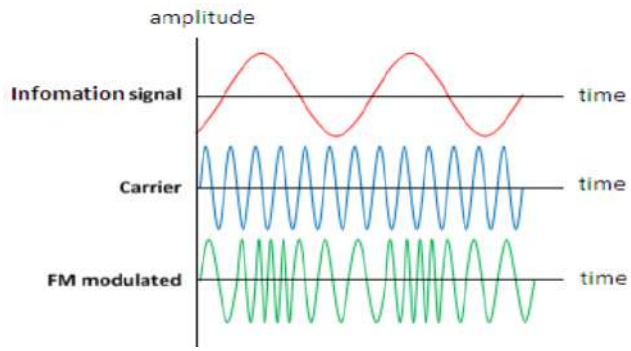
## CHAPTER -10 COMPUTER NETWORKS-II

**Network stack**




**Amplitude and frequency modulation**

- **Modulation**: It is a process of changing the characteristics of the carrier wave by super imposing the message signal on a high frequency signal.
- **Amplitude:** The amplitude of the wave is the maximum distance from mean position.
- **Frequency**: It is the number of waves produced by the source per second.

| Amplitude modulation | Frequency modulation |
|---|---|
| The strength of the carrier signal is varied with the change in the amplitude of the modulating signal. | The frequency of the carrier signal is varied with the change in the amplitude of the modulating signal. |
|  |  |

**Collision in wireless networks**

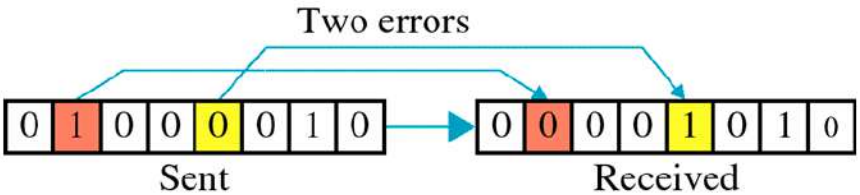
Collisions occur on a network when two or more networked devices transmit data at the same time. The result is that the data collides, becomes corrupted, and needs to be re-sent. CSMA/CA is the protocol used for handling collision in wireless network.

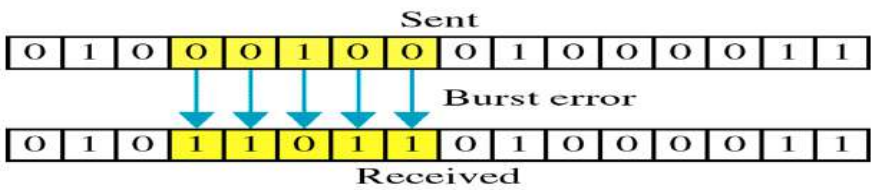
- **Working**

With CSMA/CA, a device listens for an opportunity to transmit the data. If the carrier is free, the sending device does not immediately transmit data. Rather, it first transmits a signal notifying other devices that it is transmitting for so much time before actually sending the data. The other device refrains from transmitting data for the specified time limit. This means data packets will never collide, although warning packets might.

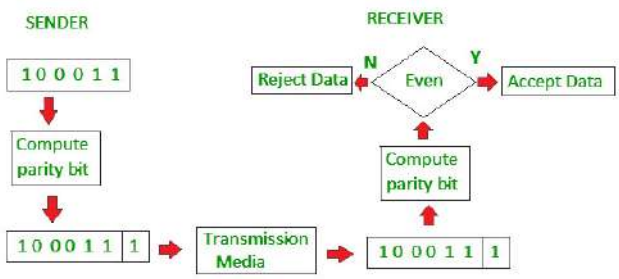
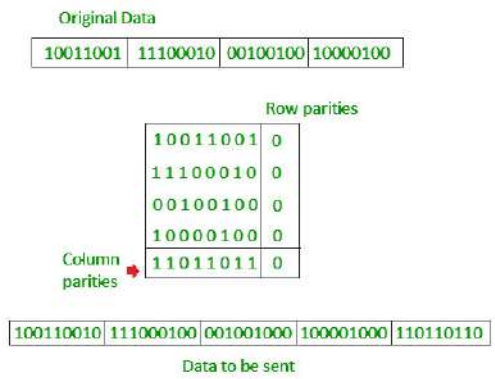
**Error checking**

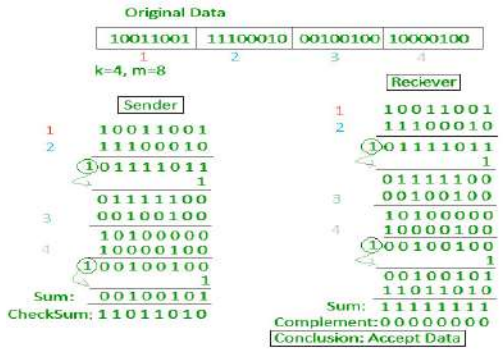
While transmitting data over networks, errors may occur and data may get corrupted. For reliable communication, errors must be detected and corrected. For example if the sender is sending the data in binary form as 10110111 and the data received by the receiver is 10110101. Here the 2nd bit from the right is changed. To avoid such errors in transmission, error detection methods are used.

| Type of error | Example |
|---|---|
| Single bit error | |
| Multiple bit error |  |

| | |
|---|---|
| Burst error |  |

**Error checking methods**

| **Error detection method** | **Description** | |
|---|---|---|
| **Single dimensional parity check** | Parity Bit: It refers to an additional bit added to the actual data. Two types of parity: even and odd parity.<br>  | Advantages:<br>✓ Easy to implement<br>✓ Inexpensive technique<br>Disadvantage:<br>× Detect only single bit error. |
| **Two-dimensional parity check** |  | Advantage:<br>✓ More efficient than single dimensional parity technique.<br>✓ Detects multiple bit error<br>Disadvantage:<br>× Cannot detect compensating multiple errors. |
| **Checksum** | It refers to a sum of data bits calculated from digital data that is used to ensure the data integrity at the receiver's end.<br><br>In checksum error detection scheme, the data is divided into k segments each of m bits. | Advantage:<br>✓ Easy to implement<br>Disadvantage<br>× cannot detect all errors |




**The notion of a MAC address**

**MAC Address**: A MAC address is the unique identifier that is assigned by the manufacturer to a piece of network hardware (like a wireless card or an Ethernet card). A MAC address is made up of six two-digit hexadecimal number, each separated by a colon.

Eg: MAC address 00:1B:f4:11:fA:B7

First three bytes represent the manufacturer- id and last three bytes represents the card-no.

**Main idea of routing**

- **Routing:**

  Routing is a process which is used to deliver the packet by choosing an optimal path from one network to another.
- **Router:** It is a network device that forwards data from one network to another.
- **Routing table**:

  It is a table maintained by each router that maintains routing information based on which router determines best path to reach the destination. The information stored in routing table are destination network, next hop, metric such as cost etc.
- **Working**:

  When a packet reaches a router, the router selects the best route to the destination network from its routing tableand forwards the data packets to the neighboring router based on selected best route. This way each router keeps passing the data packets to its neighboring router on best route to the destination and finally the data packet reaches its destination.

**IP addresses**

It is a unique address used to identify a device on the internet. It is written in dotted decimal form.
Eg: 216.27.61.137
Two versions of internet protocol are IPv4 and IPv6.

| IPv4 | IPv6 |
|---|---|
| **IPv4 has 32-bit address length** | IPv6 has 128-bit address length |
| **Address representation of IPv4 in decimal** | Address representation of IPv6 is in hexadecimal |
| **Format: x.x.x.x**<br><br>**Where x is an octet and value between 0 and 255** | Format: y:y:y:y:y:y:y:y<br><br>y is a segment and can be hexadecimal value between 0 to FFFF |
| **Eg: 19.117.36.126** | Eg: 2001:db8:3333:3555:6666:7777:BBBB:8888 |

**DNS(Domain name system)**

The URL of a website is also known as domain name. It is the unique name of a website. A domain name mainly consist of www, name describing the website's purpose, and top level domain such as .com, .net, .org etc
Eg: www.cbse.nic.in, www.amazon.com

- **Use of DNS**

The websites are mostly accessed through their domain names, because the domain name is much easier to memorise and recognize. But to reach a website, corresponding IP address is needed. So to convert the domain name to its corresponding IP address, DNS is used.

Domain Name Resolution: It refers to the process of obtaining corresponding IP address from a domain name**.**

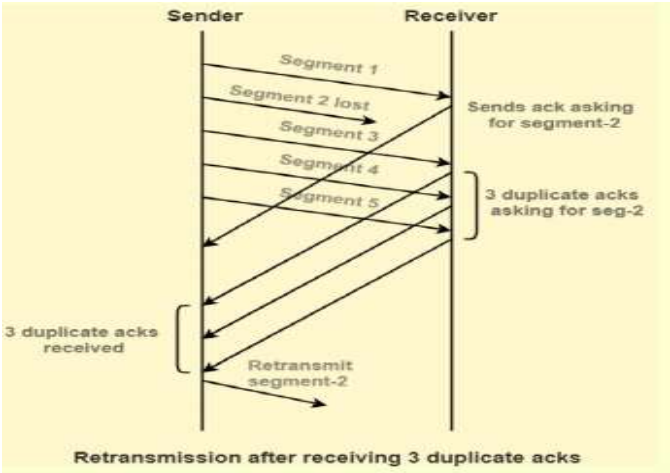
**Web URLs**

A Uniform Resource Locator, also known as web address, is a reference to a web resource that specifies its location on a computer network and a mechanism for retrieving it.
Eg: http://www.cbse.nic.in/newsite/index.html

- **Elements of URL**:

The type of server or protocol: eg: http
The name/address of the server on the internet (domain name): eg: cbse.nic.in
The location of the file on the server (path): eg: newsite/index.html

**TCP (Transmission control protocol)**




It is connection oriented protocol. In TCP, a connection is established before information is send or received.

**Retransmission:**

It is a process of retransmitting a TCP segment. TCP retransmission occurs when time out timer expires before receiving the acknowledgement or 3 duplicate acknowledgements are received from the receiver for the same segment**.**

- **Rate modulation**: It is the number of symbol / signaling changes during transmission per time unit. It is measured in baud (Bd)/symbol per second.
- **Rate modulation in congestion:**

Congestion occurs when the number of packets being transmitted through the network approaches the packet handling capacity of the network. Whenever there is a timeout, TCP assumes congestion in the network and starts to reduce its sending rate. If the sending rate is G at a wireless link with packet loss rate p, the throughput of this link is $S = G(1 - p)$. TCP should increase its sending rate G to get a large throughput if there is no congestion, rather than decreasing its rate.

**Protocols**

| | |
|---|---|
| 2G | ✓ It allowed some data along with calls in the form of text messages.<br>✓ Data speeds up to 250Kbps<br>✓ Transmitted at frequencies between 900Mhz and 1800Mhz |
| 3G | ✓ It can handle data in the form of text messages and multimedia such as audio/video messages along with voice calls.<br>✓ Data speed upto 20 Mbps<br>✓ Frequency 2100Mhz |
| 4G | ✓ Data speeds upto 50Mbps<br>✓ Frequency range is 1800Hz to 2300Hz |

**Bandwidth-**

It refers to the transmission capacity of a computer or a communications channel. Higher frequencies offer higher bandwidth. It means they can handle more users, more data at the same time.

**Wi-Fi**

It governs the rules to connect internet without a direct line from PC to the ISP. A Wi-Fi hotspot is a venue that offers Wi-Fi access.

**Basic network tools**

| | |
|---|---|
| PING | •To test the connectivity between two hosts, ping command is used.<br>•Determines whether the remote machine can receive the test packet and reply. |
| TRACEROUTE | • To trace the network path, the signal takes from your computer to the destination computer, we use TRACEROUTE command.<br>•It is a utility to view the number of hops and response time to get a remote system or website. |
| NSLOOKUP | • For diagnosing DNS name resolution problems, we use the command NSLOOKUP.<br>• It displays the name and IP address of your computer's default DNS server. |
| IPCONFIG | • It displays the detailed information about the network you are connected |
| WHOIS | • It is a query command that is used to get some information on a specific domain name, such as who registered it , when was it regsitered, and when the domain will expire etc. |
| SPEED TEST | •To check the download and upload speeds of your network connections, we use speed-test utility. |

Netstat: It stands for Network Statistics. This command displays incoming and outgoing network connections as well as other network information.

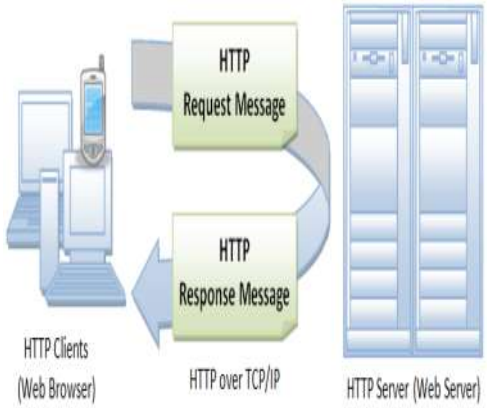
**Application Layer**

The application layer is at the topmost position of the protocol hierarchy. It is the layer where actual communication is initiated. Eg for some application layer protocols are HTTP, FTP etc.

- **HTTP**

HTTP stands for hypertext transfer protocol and is used to transfer data across the Web. It allows users of the World Wide Web to exchange information found on web pages. When accessing any web page entering http:// in front of the address tells the browser to communicate over HTTP.

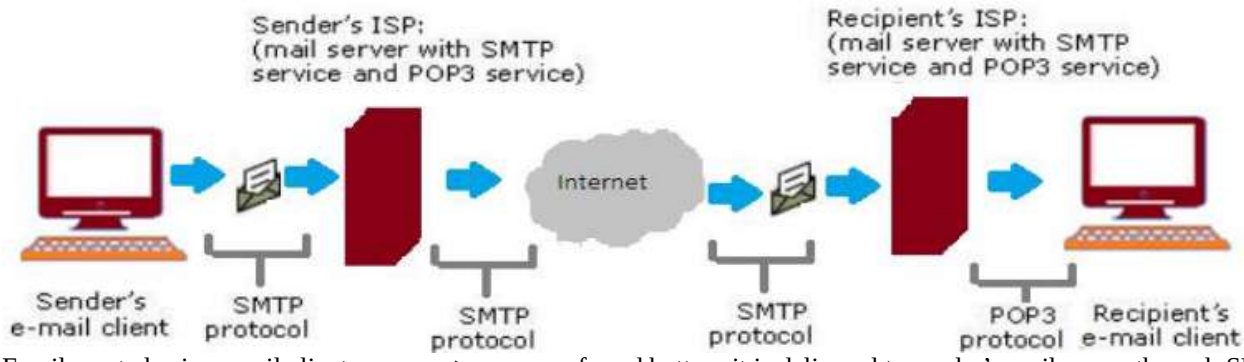
**Working**




It is a connectionless text based protocol. Clients (web browsers) send requests through request object of http to web servers for web pages / images etc. Web server respond accordingly through response object of http. After this cycle (request – response), the connection between client and server across the Internet is disconnected. A new connection must be made for each request (means for each web page).

**Working of email**

**Email** –Electronic mail is a facility that allows users to transmit messages across the internet in fast and secure manner.




Email created using email client program->on press of send button, it is delivered to sender's mail server through SMTP (Simple mail transfer protocol) ->which further transmit the same through internet to recipient's mail server->whenever recipient's email client program's inbox is opened, that email is delivered to inbox through POP3 (post office protocols 3rd version) ->which user will read in email client program.

**Secure communication**

Secure communication is when sender and receiver are communicating and do not want a third party to listen it. One method used for secure communication is encryption.

Encryption: It is a technique used to translate the original message into another form.

Decryption: It is a technique of converting encrypted message back to original message.

- **HTTPS**

HTTPS stands for Hypertext Transfer Protocol Secure and it is a combination of HTTP and SSL/TLS protocols. HTTPS provides encrypted communication. HTTPS encrypts the data and establishes a secure channel over a non-secure network to ensure protected data transfer. Thus data is protected from hackers and eavesdroppers.

SSL stands for secure socket layer protocol. The working of SSL requires that the website has SSL certificate installed which ensure its authenticity. Once installed, the sensitive information obtained from the user through a secure connection over internet.

**Network Applications**

- Remote desktop – It is a type of network application through which a person can work on the desktop of another computer in the same manner as if that computer is in front of the person.

- Remote login- This facility permits a user to work on a program on a distinct computer based on valid login credentials.

| Protocol | Description |
|---|---|
| HTTP<br><br>(Hyper Text Transfer Protocol) | ✓ It is an application-level protocol with speed necessary for distributed, collaborative, hypermedia information system.<br>✓ It is a generic, stateless object protocol<br>✓ It consist of two distinct items<br>i. The set of requests from browser to servers<br>ii. Set of response going back to the other way |
| FTP | ✓ Standard protocol for the exchange of files across internet. |

| | |
|---|---|
| (File Transfer Protocol) | ✓ It is a popular way to share information over the internet |
| POP<br><br>(Post Office Protocol) | ✓ POP3 defines the rules about receiving emails from a remote server to local email client.<br>✓ It is suitable if you are accessing the emails using a single application or from single location.<br>✓ It works on two ports:<br>i. Port 110- used for unsecured email communication<br>ii. Port 995 – Used for secure email communication |
| IMAP<br><br>(Internet Message Access Protocol) | ✓ It is also used for accessing emails on a remote webserver and downloads them to local clients.<br>✓ It supports multiple applications, multiple clients and multiple locations.<br>✓ It works on two ports:<br>i. Port 143- default, Unsecure communication<br>ii. Port 993 – encrypted port (secure communication) |
| SMTP<br>(simple mail Transfer Protocol) | ✓ It is used to sending mails across the internet<br>✓ It works on two ports:<br>i. Port 25 – used for unsecured email communication<br>ii. Port 465 – encrypted port (secure communication) |
| VoIP<br>(Voice over Internet Protocol) | ✓ Technology enables voice communication over the internet through the compression of voice into data packets that can be transmitted over data network and converted back into voice in the other end. |
| NFC<br><br>(Near Field Communications) | ✓ It is a protocol used to provide short range wireless connectivity between two electronic devices within the distance of 4-5 cm. |
| SCP(Session Control Protocol) | ✓ It securely transfers computer files between a local host and a remote host or between two remote hosts. |
| SSH(Secure Shell Protocol) | ✓ It is a cryptographic network protocol for operating network services securely over an unsecured network. |

**Question**

Q1. The following is a 32-bit binary number usually represented as 4 decimal values, each representing 8 bits, in the range 0 to 255(known as octets) separated by decimal points.

140.179.220.200

What is it? What is its importance?

Ans: It is an IP Address.It is used to identify the computers on a network.

Q2. Name the network tools used in the given situations:

a. To troubleshoot internet connection problems
   Ans: ping
b. To see the IP address associated with a domain name
   Ans: nslookup
c. To lookup registration record associated with a domain name.
   Ans: whois

d. To test the speed of internet connection

Ans: speedtest.net

Q3. Expand the following

(i) VoIP

Ans: Voice over Internet Protocol

(ii) SMTP

Ans: Simple Mail Transfer Protocol

(iii) CSMA

Ans: Carrier sense Multiple Access

(iv) TCP/IP

Ans: Transmission Control Protocol/Internet Protocol

Q4. The wireless networks employ strategies to avoid collision. Why can't they detect collisions?

Ans: Collisions occur when multiple transmissions takes place at the same over a network. Wireless networks are half duplex in nature that is they cannot listen while transmitting. Hence they cannot find out if any other transmission is taking place simultaneously, and thus cannot detect collision

Q5. When you move the NIC cards from one PC to another PC, does the MAC address gets transferred as well?

Ans: Yes, that's because MAC addresses are hard-wired into the NIC circuitry, not the PC. This also means that a PC can have a different MAC address when the NIC card was replace by another one.

Q6. Which protocol helps us to transfer files to and from a remote computer?

Ans: FTP (File transfer protocol)

Q7. Which protocol is used to search information from internet using browser?

Ans: HTTP (Hyper Text Transfer Protocol

Q8. Identify the protocol, domain name and path from the given URL https://www.w3schools.com/html/default.asp. What is the name of the process to obtaining corresponding IP address from the domain name?

Ans: Protocol: https

Domain name: www.w3schools.com

Path: html/default.asp

The process to obtaining corresponding IP address from the domain name is domain name resolution.

Q9.Assume that 8 bit checksum is used for error detection. The data to be transmitted is given below.

10011001111000100010010010000100. Calculate the checksum value?

Ans: Step 1: Add all segments and find the sum

10011001 + 11100010=101111011 [1 extra bit, so add to the result]

01111011+1=01111100

01111100+00100100=10100000 [No extra bit]

10100000+10000100=100100100 [1 extra bit, so add to the result]

00100100+1=00100101

Step 2: find the complement of sum: 11011010

Checksum value =11011010

Q10. What is MAC address? How it differ from IP address? Give example?

Ans: A MAC address is the unique identifier that is assigned by the manufacturer to a piece of network hardware. It is a unique address used to identify a device on the internet.

Eg: MAC address: 00:1B:f4:11: fA: B7

IP address: 216.27.61.137

Q11. Suppose you want to perform any financial transaction through the internet. How can you check if the connection is secure or not?

Ans: Before entering any financial information, first make sure that URL starts with HTTPS and then check the padlock sign on the navigator bar. If both are there, then the connection is secure.

**Short and long answer Questions**

1. Define amplitude?
2. Give example for IP address?
3. List out any four network tools?
4. Which is the protocol used to handle congestion in wireless network?
5. Give eg for connection oriented protocol?
6. Differentiate amplitude modulation and frequency modulation?
7. What are the different types of errors occur when date is transmitted over network? Give example for each.
8. Differentiate IPv4 and IPv6?
9. What are the different wireless connectivity protocols?
10. What happens behind the scenes when you send an email, before it reaches the destination?
11. Differentiate the use of POP and SMTP protocol in email?
12. What is SSL? How does it affect the communication over internet?
13. Define checksum? What are the steps to find out checksum?
14. What type of information is stored in routing table?
15. What measures do wireless networks employ to avoid collision?

**Previous year board questions and answers**

1. ABC Company wants to link its computers in Head office in New Delhi to its office in Sydney. Name the type of Network that will be formed. Which communication media should be used to form this Network?
   Ans: Type of network that will be formed: Wide Area Network (WAN)
   Transmission media to be used: Satellite
2. Which of the following is/are not communication media?
   a. Microwaves b. Optical Fiber cable c. Node d. Radio waves
   b. Identify which of the above mentioned communication media are wired media and which ones are Wireless media.
   Ans. Not communication media: Node
   Wired media: Optical Fiber cable
   Wireless media: Microwaves, Radio waves
3. Name the devices:
   This device connects multiple nodes to form a network. It redirects the received information only to the intended node(s).
   Ans: Switch
4. Write the expanded names for the following abbreviated terms used in Networking and Communications :
   i. SMTP
   ii. VoIP
   iii. GSM
   iv. WLL

   Ans: i. Simple Mail Transfer Protocol ii. Voice over Internet Protocol iii. Global System for Mobile Communication iv. Wireless Local Loop
5. Differentiate between communication using Optical Fiber and Ethernet Cable in context of wired medium of communication technologies.
   Ans:
   Optical Fibre - Very Fast - Expensive - Immune to electromagnetic interference Ethernet Cable - - Slower as compared to Optical Fiber - Less Expensive as compared to Optical Fiber - prone to electromagnetic interference
6. Identify odd one out of the following:
   Optical Fiber/Coaxial Cable/ Bluetooth/Twisted Pair Cable. Give reason for your answer.
   Ans: Odd one: Bluetooth
   Reason: Bluetooth is a wireless/unguided communication media while others are wired/guided communication media.

7. How is it easier to diagnose fault in Star topology than in Bus topology?

Ans: In Star topology each node is directly connected to a central hub / switch, hence fault diagnosis becomes easy. In bus topology all the nodes are connected to the backbone cable. The signal travels through the entire length of the backbone and is received by the node for which it is intended. Hence, fault diagnosis is difficult.

8. Which of the following are valid IP addresses? Give reason(s) if invalid.

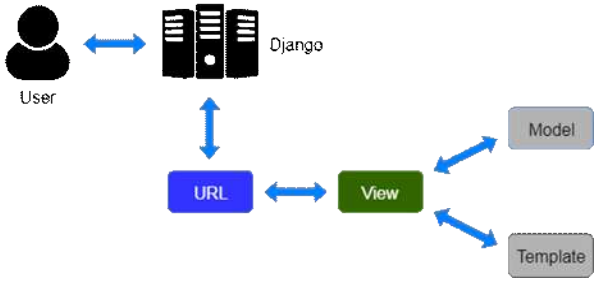
i) 121.23.1.45
ii) 192.168.0. 254
iii) 192.168.0.1
iv) 198.-1.1.1

Ans: Valid IP addresses: (i), (ii), (iii) Invalid IP address: (iv) 198.-1.1.1 because an IP address is a group of four bytes; each of which can be a number from 0 to 255.

# UNIT 3 DATA MANAGEMENT DM-2

## CHAPTER-11 Django

- Django- Django isa free and open source high level python web application framework.
- GET request-An HTTP GET request is a way to retrieve information from the given server using a given URL over web.
- POST request-An HTTP POST request is a way to send data to the server using HTML forms over web.
- Django Architecture-Django runs on MVT/MVC architecture. Django architecture components are Models, Views, Templates, Controller.
- Command to install Django- pip install Django
- Command to create a project- django-admin startproject <projectname>
- To start a server- python manage.py runserver
- Command to create a new web application- django-admin startapp<appname>
- MVT-Model is data management components, View is handling logic that links the URLs and templates through URL routing, and Template is responsible for presentation logic for a Django project.




- Web Framework-A software tool that supports the development of dynamic sites, web services, and web applications.
- Virtualenv -Virtualenv is a useful tool which creates isolated Python Environment that take care of interdependencies and let us develop different applications in isolation.
- CSV (Comma Separated Values). A csv file is a type of plain text file that uses specific structuring to arrange tabular data. CSV is a common format for data interchange as it is compact, simple and general. Each line of the file is one line of the table. CSV files have .csv as file extension.

```
import csv with open('C:\\data.csv','rt') as f:

        data = csv.reader(f)      #reader function to generate a reader object

for row in data:

        print(row)
```

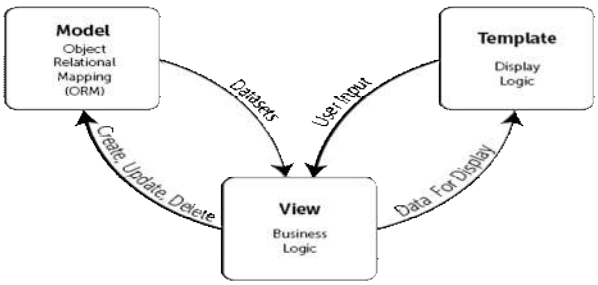
When we create a project in Django following files are created in project's folder:

- __init__.py: An empty file that tells Python that this directory should be considered a Python package.
- settings.py: Settings/configuration for this Django project.

- urls.py: The URL declarations for this Django project; a “table of contents” of your Django-powered site.
- wsgi.py: An entry-point for WSGI-compatible web servers to serve your project.

**Chapter – 11 :Creating a Django based Basic Web Application (Question and Answers) (1 mark Question)**

Q.1) What is Django?
Ans: - Django is a web framework used with Python to develop Dynamic Websites. Here web framework is actually a software tool that helps to build and run Dynamic websites and web – enabled applications.
Q.2) How a web works?
Ans: - A Web works in the form of Client -Server architecture. Web browser acts as a client programme and the web server interacts as the server.
Q.3) Which protocol widely used by the clients of web ie web browsers?
Ans: - Mostly web browsers work with Hyper Text Transfer Protocols (HTTP)
(2 mark questions)
Q.4) Explain the working of HTTP GET and HTTP POST request?
Ans: - HTTP GET : - Whenever a web client has to display a webpage it calls the HTTP GET request and send the URL of the webpage. The server receives the GET request and respond by sending HTML of the URL, if available; but if the URL is not existing it sends error 404.
HTTP POST: - An HTTP POST request is a way to send data to the server using HTML forms over web.
Q.5) Write the characteristics of Django?
Ans: - 1) Django is Python based free and Open Source web application framework.
2) Django is powerful server-side web framework used by many developers as it is versatile, Portable and Secure.
Q.6) What do you know about Virtualenv?
Ans: - Virtualenv is a useful tool which creates isolated Python Environment that take care of interdependencies and let us develop different applications in isolation.
Each isolated environment has different set of libraries unlike a common global set of libraries.
Q.7) Differentiate between a project and an app?
Ans: - A project refers to an entire application. There can be multiple apps in a project.
Whereas, an app is a submodule which take cares of one part of the project.
Q.8) Write the use of the following files: -
admin.py, apps.py, models.py, tests.py, views.py, migrations/
Ans: - 1) admin.py – It is a configuration file for the build in Django Admin app
2) apps.py - It is a configuration file for the app itself
3) models.py - It is the file where we will define the database models.
4) tests.py – This file is for our app-specific tests
5) views.py – This file is for resolving http request/response for our web app
6) migrations/ - This folder keeps track of changes in models.py file and updates database accordingly.
Q.9) Explain MVC Project Architecture.
Ans: - MVC ie Model, View Controller Architecture.
Here Model is the lowest level of pattern responsible for maintain data.
View is responsible for displaying all or a portion of data to the user.
Controller is the software code that controls the interaction between the Model and View.
Q.10) Explain MVT Project Architecture of Django.
Ans: - MVT is Model, View Template architecture which is slightly different from MVC. In fact the main difference between the two patterns is that Django itself takes care of the controller part (Software code) and leaving us with the template. The template is a HTML file mixed with Django Template Language (DTL).The develop provides the model, the view and the template then just maps it to a URL and Django does the magic to serve it to the user.



Q.11) What is the role of Django in website design?
Ans:-Django is a high level python web framework, designed to help build complex web applications simply and quickly.Django makes it easier to build better web apps quickly and with less code.
Q.12)Write the difference between GET and POST method.
Ans:-A web browser may be the client and the application on a computer that hosts the website may be the server:(i)GET:To request data from the server
(ii)POST:To submit data to be processed to the server

---

## Chapter 12: Interface Python with an SQL database

- Database connectivity-Database connectivity refers to connection and communication between an application and a database system.
- Mysql.connector-Library or package to connect from python to MySQL.
- Command to install connectivity package:- pip install mysql-connector-python
- Command to import connector:- import mysql.connector
- Steps for python MySQL connectivity
  1 . Install Python
  2. Install MySQL
  3. Open Command prompt
  4. Switch on internet connection
  5. Type pip install mysql-connector-python and execute
  6. Open python IDLE
  7. import mysql.connector
- Multiple ways to retrieve data:
  fetchall()-Fetch all (remaining) rows of a query result, returning them as a sequence of sequences (e.g. a list of tuples)
  fetch many (size)-Fetch the next set of rows of a query result, returning a sequence of sequences. It will return number of rows that matches to the size argument.
  fetchone()-Fetch the next row of a query result set, returning a single sequence or None when no more data is available
- Functions to execute SQL queries

**#CREATE DATABASE**

```
import mysql.connector
mydb=mysql.connector.connect(host="localhost",user="root",passwd="12345")
mycursor=mydb.cursor()
mycursor.execute("CREATE DATABASE SCHOOL")
```

**# SHOW DATABASE**

```
import mysql.connector
mydb=mysql.connector.connect(host="localhost",user="root",passwd="12345")
mycursor=mydb.cursor()
mycursor.execute("SHOW DATABASE")
for x in mycursor:
    print (x)
```

**# CREATE TABLE**

```
import mysql.connector
mydb=mysql.connector.connect(host="localhost",user="root",passwd="12345",database="student")
mycursor=mydb.cursor()
mycursor.execute("CREATE TABLE FEES (ROLLNO INTEGER(3),NAME VARCHAR(20),AMOUNT INTEGER(10));")
```

**# SHOW TABLES**

```
import mysql.connector
mydb=mysql.connector.connect(host="localhost",user="root",passwd="12345",database="student")
mycursor=mydb.cursor()
mycursor.execute("SHOW TABLES")
for x in mycursor:
    print(x)
```

**#DESCRIBE TABLE**

```
import mysql.connector
```

```
    mydb=mysql.connector.connect(host="localhost",user="root",passwd="12345",database="student")
    mycursor=mydb.cursor()
    mycursor.execute("DESC STUDENT")
    for x in mycursor:
        print(x)
```

**# SELECT QUERY**

```
    import mysql.connector
    conn=mysql.connector.connect(host="localhost",user="root",passwd="12345",database="student")
    c=conn.cursor()
    c.execute("select * from student")
    r=c.fetchone()
    while r is not None:
        print(r)
        r=c.fetchone()
```

**#WHERE CLAUSE**

```
    import mysql.connector
    conn=mysql.connector.connect(host="localhost",user="root",passwd="12345",database="student")
    if conn.is_connected==False:
        print("Error connecting to MYSQL DATABASE")
    c=conn.cursor()
    c.execute("select * from student where marks>90")
    r=c.fetchall()
    count=c.rowcount
    print("total no of rows:",count)
    for row in r:
        print(row)
```

**# DYNAMIC INSERTION**

```
    import mysql.connector
    mydb=mysql.connector.connect(host="localhost",user="root",passwd="12345",database="student")
    mycursor=mydb.cursor()
    r=int(input("enter the rollno"))
    n=input("enter name")
    m=int(input("enter marks"))
    mycursor.execute("INSERT INTO student(rollno,name,marks) VALUES({},'{}',{})".format(r,n,m))
    mydb.commit()
    print(mycursor.rowcount,"RECORD INSERTED")
```

**# UPDATE COMMAND**

```
    import mysql.connector
    mydb=mysql.connector.connect(host="localhost",user="root",passwd="12345",database="student")
    mycursor=mydb.cursor()
    mycursor.execute("UPDATE STUDENT SET MARKS=100 WHERE MARKS=40")
    mydb.commit()
    print(mycursor.rowcount,"RECORD UPDATED")
```

**# DELETE COMMAND**

```
    import mysql.connector
    mydb=mysql.connector.connect(host="localhost",user="root",passwd="12345",database="student")
    mycursor=mydb.cursor()
    mycursor.execute("DELETE FROM STUDENT WHERE MARKS<50")
    mydb.commit()
    print(mycursor.rowcount,"RECORD DELETED")
```

**# DROP COMMAND**

```
    import mysql.connector
    mydb=mysql.connector.connect(host="localhost",user="root",passwd="12345",database="student")
    mycursor=mydb.cursor()
    mycursor.execute("DROP TABLE STUDENT")
```

**# ALTER COMMAND**

```
    import mysql.connector
```

```
mydb=mysql.connector.connect(host="localhost",user="root",passwd="12345",database="student")
mycursor=mydb.cursor()
mycursor.execute("ALTER TABLE STUDENT ADD GRADE CHAR(3)")
```

Chapter -12 Data Base Connectivity (Questions and answers)

**(1 mark question)**

Q.1.1 What is database.

Ans. The database is a collection of organized information that can easily be used, managed, update, and they are classified according to their organizational approach.

Q.1.2 Write command to install connector.

Ans. pip install mysql-connector-python

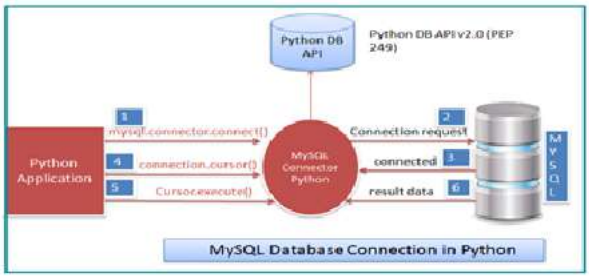
Q.1.3 Write command to import connector.

Ans. import mysql.connector

**(2 mark question)**

Q.2 write the steps of connectivity between SQL and Python

Ans. import,connect,cursor,execute




Q.3 What is result set? Explain with example.

Ans. Fetching rows or columns from result sets in Python. The fetch functions in the ibm_db API can iterate through the result set. If your result set includes columns that contain large data (such as BLOB or CLOB data), you can retrieve the data on a column-by-column basis to avoid large memory usage.

Q.4 Use of functions in connectivity - INSERT, UPDATE, DELETE, ROLLBACK

Ans.

| Environment Variables | Description |
|---|---|
| INSERT | It is an SQL statement used to create a record into a table. |
| UPDATE | It is used update those available or already existing record(s). |
| DELETE | It is used to delete records from the database. |
| ROLLBACK | It works like "undo", which reverts all the changes that you have made. |

Q.5 Write code for database connectivity

Ans.
```
# importing the module
import mysql.connector
# opening a database connection
        conn = mysql.connector.connect  ("localhost","testprog","stud","PYDB")
# define a cursor object
        mycursor = conn.cursor
# drop table if exists
```

```
            mycursor.execute("DROP  TABLE  IF EXISTS STUDENT”)
        # query
            sql = "CREATE TABLE STUDENT (NAME CHAR(30) NOT NULL, CLASS CHAR(5), AGE INT,
            GENDER CHAR(8), MARKS INT)"
        # execute query
            cursor.execute(sql)
        # close object
            cursor.close()
        # close connection
            conn.close()
```

Q.6 Which method is used to retrieve all rows and single row?

Ans:-Fetchall(),fetchone()

Q.7 Write python-mysql connectivity to retrieve all the data of table student.

Ans:-

```
import mysql.connector
mydb=mysql.connector.connect(user="root",host="localhost",passwd="123",database="inservice")
mycursor=mydb.cursor()
mycursor.execute("select * from student")
for x in mycursor:
    print(x)
```

---

## Chapter 13: SQL commands: aggregation functions – having, group by, order by

- **ORDER BY Clause**: You can sort the result of a query in a specific order using ORDER BY clause. The ORDER BY clause allow sorting of query result by one or more columns. The sorting can be done either in ascending or descending order.
  Note: - If order is not specified then by default the sorting will be performed in ascending order.
  e.g., Select * from emp order by deptno
  Three methods of ordering data are:
  1. Ordering data on single column.
  2. Ordering data on multiple column.
  3. Ordering data on the basis of an expression
- **Aggregate Functions:** These functions operate on the multiset of values of a column of a relation, and return a value
  avg: average value,
  min: minimum value ,
  max: maximum value ,
  sum: sum of values ,
  count: number of values
  These functions are called aggregate functions because they operate on aggregates of tuples. The result of an aggregate function is a single value.
  e.g., Select deptno, avg (sal), sum (sal) from emp group by deptno
- **GROUP BY Clause**: The GROUP BY clause groups the rows in the result by columns that have the same values. Grouping is done on column name. It can also be performed using aggregate functions in which case the aggregate function produces single value for each group.
  e.g., Select deptno, avg (sal), sum (sal) from emp group by deptno
- **HAVING Clause:** The HAVING clause place conditions on groups in contrast to WHERE clause that place conditions on individual rows. While WHERE condition cannot include aggregate functions, HAVING conditions can do so.
  e.g., Select deptno, avg (sal), sum (sal) from emp group by deptno having deptno=10;
  Select job, count (*) from emp group by job having count (*) <3;

**Revision of MySQL:-**

**Field:** Set of characters that represents specific data element.
**Record:** Collection of fields is called a record. A record can have fields of different data types.
**File:** Collection of similar types of records is called a file.
**Table:** Collection of rows and columns that contains useful data/information is called a table

**Database:** Collection of logically related data along with its description is termed as database.
**Relation:** Relation (collection of rows and columns) on which we can perform various operations. It is also known as table.
**Tuple:** A row in a relation is called a tuple. It is also known as record.
**Attribute:** A column in a relation is called an attribute. It is also termed as field or data item.
**Degree:** Number of attributes in a relation is called degree of a relation.
**Cardinality:** Number of tuples in a relation is called cardinality of a relation.
**Primary Key**: Primary key is a key that can uniquely identifies the records/tuples in a relation. This key can never be duplicated and NULL.
**Foreign Key:** Non key attribute of a table acting as primary key in some other table is known as Foreign Key in its current table. This key is used to enforce referential integrity in RDBMS.
**Candidate Key:** Attributes of a table which can serve as a primary key are called candidate keys.
**Alternate Key:** All the candidate keys other than the primary key of a relation are alternate keys for a relation.
**DBA:** Data Base Administrator is a person (manager) that is responsible for defining the data base schema, setting security features in database, ensuring proper functioning of the data bases etc.
**Select Operation:** The select operation selects tuples from a relation which satisfy a given condition. It is denoted by lowercase Greek Letter σ (sigma).
**Project Operation:** The project operation selects columns from a relation which satisfy a given condition. It is denoted by lowercase Greek Letter π (pi). It can be thought of as picking a sub set of all available columns.
**Union Operation:** The union (denoted as ∪) of a collection of relations is the set of all distinct tuples in the collection. It is a binary operation that needs two relations.
**Set Difference Operation:** This is denoted by - (minus) and is a binary operation. It results in a set of tuples that are in one relation but not in another

**Structured Query Language**

SQL is a non procedural language that is used to create, manipulate and process the databases(relations).

**1. Data Definition Language (DDL)**
DDL contains commands that are used to create, modify or remove the tables, databases, indexes, views, sequences and synonyms etc.
e.g: Create table, create view, create index, alter table, drop table etc.

**2. Data Manipulation Language (DML)**
DML contains commands that can be used to manipulate the data base objects and to query the databases for information retrieval.
e.g: Select, Insert, Delete, and Update.

**3. Transaction Control Language (TCL)**
TCL include commands to control the transactions in a data base system. The commonly used commands in TCL are COMMIT, ROLLBACK, and SAVEPOINT.

**Operators in SQL**: The following are the commonly used operators in SQL
1. Arithmetic Operators +,-,*, /
2. Relational Operators =, <,>, <=,>=,<>
3. Logical Operators OR, AND, NOT

**Data types of SQL**: Just like any other programming language, the facility of defining data of various types is available in SQL also. Following are the most common data types of SQL.
1) NUMBER e.g. Number (n, d) Number (5, 2)
2) CHAR e.g. CHAR (SIZE)
3) VARCHAR / VARCHAR2 e.g. VARCHAR2 (SIZE)
4) DATE DD-MON-YYYY

**Constraints:** Constraints are the conditions that can be enforced on the attributes of a relation. The constraints come in play whenever we are trying to insert, delete or update a record in a relation.
Not null ensures that we cannot leave a column as null. That is a value has to be supplied for that column.

E.g.name varchar (25) not null

**Unique constraint** means that the values under that column are always unique.

E.g.Roll_no number (3) unique

**Primary key** constraint means that a column cannot have duplicate values and not even a null value.

e.g. Roll_no number (3) primary key

The main difference between unique and primary key constraint is that a column specified as unique may have null value but primary key constraint does not allow null values in the column.

**Foreign key** is used to enforce referential integrity and is declared as a primary key in some other table.

e.g. cust_id varchar (5) references master (cust_id)

It declares cust_id column as a foreign key that refers to cust_id field of table master.

That means we cannot insert that value in cust_id filed whose corresponding value is not present in cust_id field of master table. Moreover we can't delete any row in master table, if a corresponding value of cust_id field is existing in the dependent table.

**Check constraint** limits the values that can be inserted into a column of a table.

e.g. marks number(3) check(marks>=0)

The above statement declares marks to be of type number and while inserting or updating the value in marks it is ensured that its value is always greater than or equal to zero.

**Default constraint** is used to specify a default value to a column of a table automatically. This default value will be used when user does not enter any value for that column.

e.g. balance number(5)default = 0

**SQL COMMANDS:**

1**. Create Table** command is used to create a table.

The syntax of this Command is: CREATE TABLE <Table_name>

(column_name 1 data_type1 [(size) column_constraints],
column_name 1 data_type1 [(size) column_constraints],
:
:
[<table_constraint> (column_names)]);

2. The **ALTER Table** commandis used to change the definition (structure) of existing table.

ALTER TABLE <Table_name>ADD/MODIFY <Column_defnition>; For Add or modify column
ALTER TABLE <Table_name> DROP COLUMN <Column_name>; For Deleting a column

3. The **INSERT Command**: The rows (tuples) are added to a table by using INSERT command.

The syntax of Insert command is:
INSERT INTO <table_name> [(<column_list>)] VALUES (<value_list>);
e.g.,
INSERT INTO EMP (empno, ename, sex, sal, deptno) VALUES (1001, 'Ravi', 'M', 4500.00, 10);

If the order of values matches the actual order of columns in table then it is not required to give the column_list in INSERT command. e.g.
INSERT INTO EMP VALUES (1001, 'Ravi', 'M', 4500.00, 10);

4. The **Update command** is used to change the value in a table. The syntax of this command is:

UPDATE <table_name>
SET column_name1=newvalue1/expression [, column_name2=newvalue2/expression …] WHERE <condition>;
e.g., to increase the salary of all the employees of department No 10 by 10%, then command will be:
UPDATE emp
SET sal=sal*1.1
WHERE Deptno=10;

5. The **DELETE command** removes rows from a table. This removes the entire rows, not individual field values.

The syntax of this command is
DELETE FROM <table_name>
[WHERE <condition>];

e.g., to delete the tuples from EMP that have salary less than 2000, the following command is used:
DELETE FROM emp WHERE sal<2000;
To delete all tuples from emp table:
DELETE FROM emp;

6. The **SELECT command** is used to make queries on database. A query is a command that is given to produce certain specified information from the database table(s). The SELECT command can be used to retrieve a subset of rows or columns from one or more tables. The syntax of Select Command is:

**SELECT <Column-list>**
**FROM <table_name>**
**[WHERE<condition>]**
**[GROUP BY <column_list>]**
**[HAVING<condition>]**
**[ORDER BY <column_list [ASC|DESC]>]**

The select clause list the attributes desired in the result of a query. e.g.,To display the names of all Employees in the emp relation:
select ename from emp;

To force the elimination of duplicates, insert the keyword distinct after select. Find the number of all departments in the emp relations, and remove duplicates
select distinct deptno from emp;

An asterisk (*) in the select clause denotes "all attributes"
SELECT* FROM emp;

The select clause can contain arithmetic expressions involving the operation, +, -, *, and /, and operating on constants or attributes of tuples.The query:
SELECTempno, ename, sal * 12 FROM emp;
would display all values same as in the emp relation, except that the value of the attribute sal is multiplied by 12.

The WHERE clause in SELECT statement specifies the criteria for selection of rows to be returned.

- Conditions based on a range (BETWEEN Operators): The Between operator defines a range of values that the column values must fall in to make condition true. The range includes both lower value and upper value.

e.g., Find the empno of those employees whose salary between 90,000 and 100,000 (that is, 90,000 and 100,000)
SELECT empno FROM emp WHERE sal BETWEEN 90000 AND 100000;

- Conditions based on a list (IN operator): To specify a list of values, IN operator is used.

IN operator selects values that match any value in a given list of values.
For example, to display a list of members from 'DELHI', 'MUMBAI', 'CHENNAI' or'BANGALORE' cities:
SELECT * FROM members WHERE city IN ('DELHI', 'MUMBAI', 'CHENNAI', 'BANGALORE');
The NOT IN operator finds rows that do not match in the list. So if you write
SELECT * FROM members WHERE city NOT IN ('DELHI', 'MUMBAI', 'CHENNAI', 'BANGALORE');
It will list members not from the cities mentioned in the list.

- Conditions based on Pattern: SQL also includes a string-matching operator, LIKE, for comparison on character string using patterns. Patterns are described using two special wildcard characters:
  Percent (%) - '%' matches any substring (one, more than one or no character).
  Underscore (_) - '_' character matches exactly one character.
  Patterns are case-sensitive.

Like keyword is used to select row containing columns that match a wildcard pattern. The keyword not like is used to select the row that do not match the specified patterns of characters.

- Searching for NULL: The NULL value in a column is searched for in a table using IS NULL in the WHERE clause (Relational Operators like =,<> etc can not be used with NULL).

For example, to list details of all employees whose departments contain NULL (i.e., novalue), you use the command:
SELECT empno, ename FROM emp Where Deptno IS NULL;

- The DROP Command: The DROP TABLE command is used to drop (delete) a table from database. But there is a condition for droping a table ; it must be an empty table i.e. a table with rows in it cannot be dropped.The syntax of this command is :
  DROP TABLE <Table_name>;
  e.g., DROP TABLE EMP;
- Query Based on Two table (Join):
  SELECT <Column-list>
  FROM <table_name1>,<table_name2>
  WHERE <Join_condition>[AND condition];

**SQL (Question and Answers)**
**(1 mark question)**

Q.1 State two advantages of using Databases.

Ans: Databases help in reducing Data Duplication i.e. Data Redundancy and controls Data Inconsistency.
Q2. Name some popular relational database management systems.
Ans: Oracle, MYSQL, Sqlite, MS-Access etc
Q.3 Define – Relation, Tuple, Degree, Cardinality
Ans: A Relation is logically related data organized in the form of tables.
Tuple indicates a row in a relation.
Degree indicates the number of Columns.
Cardinality indicates the number of Columns.
Q4. What is Data Dictionary?
Ans: Data Dictionary contains data about data or metadata. It represents structure or schema of a database?
Q5. Name some data types in MySQL
Ans: Char, Varchar, Int, Decimal, Date, Time etc.
(2 mark question)
Q6. Differentiate between Char and Varchar.
Ans: Char means fixed length character data and Varchar means variable length character data. E.g. For the data "Computer" char (30) reserves constant space for 30 characters whereas Varchar (30) reserves space for only 8 characters.
Q.7 What is a Primary Key?
Ans: A Primary Key is a set of one or more attributes (columns) of a relation used to uniquely identify the records in it.
Q.8 What is a Foreign Key? What is its use?
Ans: A Foreign key is a non-key attribute of one relation whose values are derived from the primary key of some other relation. It is used to join two / more relations and extract data from them.
Q.9 Write SQL statements to do the following
(a)Create a table Result with two columns Roll and Name with Roll as primary key
CREATE TABLE Result
(Roll INT PRIMARY KEY, Name Varchar (30))
(b)Add a column Marks to Result table
ALTER TABLE Result
ADD (Marks DECIMAL (10,2))
Insert a record with values 1, "Raj", 75.5
INSERT INTO Result
VALUES (1,"Raj",75.5)
(d)Show the structure of Result table
DESCRIBE Result
(e) Display the records in ascending order of name
SELECT * FROM Result
ORDER BY Name
(f)Display records having marks>70
SELECT * FROM Result
WHERE Marks > 70
(g)Update marks of,"Raj" to 80
UPDATE Result
SET Marks = 80
WHERE Name="Raj"
Q10. What are the various Integrity Constraints?
Ans: Various Integrity Constraints are –
NOT NULL – Ensures value for the column is not left unassigned
UNIQUE – ensures that all values in a column are distinct or no two rows can have the same values for a column having UNIQUE constraint
CHECK – Ensures that values for a particular column satisfy the specified condition
DEFAULT – Ensures that the default value is assumed if value for the column is not specified
PRIMARY KEY – Automatically applies UNIQUE and NOT NULL for uniquely identifying rows / records in a table

**6 - Marks Questions**

Q1. Consider the following tables GAMES and PLAYER. Write SQL commands for the statements (i) to (iv) and give outputs for SQL queries (v) to (viii).

Table: GAMES

| GCode | GameName | Number | PrizeMoney | ScheduleDate |
|---|---|---|---|---|
| 101 | Carom Board | 2 | 5000 | 23-Jan-2004 |
| 102 | Badminton | 2 | 12000 | 12-Dec-2003 |
| 103 | Table Tennis | 4 | 8000 | 14-Feb-2004 |
| | | | | |

Table: PLAYER

| PCode | Name | Gcode |
|---|---|---|
| 1 | Nabi Ahmad | 101 |
| 2 | Ravi Sahai | 108 |
| 3 | Jatin | 101 |
| 4 | Nazneen | 103 |

(i) To display the name of all Games with their Gcodes.
(ii) To display details of those games which are having PrizeMoney more than 7000.
(iii) To display the content of the GAMES table in ascending order of ScheduleDate.
(iv) To display sum of PrizeMoney for each of the Number of participation groupings (as shown in column Number 2 or 4).
(v) SELECT COUNT(DISTINCT Number) FROM GAMES;
(vi) SELECT MAX(ScheduleDate),MIN(ScheduleDate) FROM GAMES;
(vii) SELECT SUM(PrizeMoney) FROM GAMES;
(viii) SELECT DISTINCT Gcode FROM PLAYER;

Ans: (i) SELECT GameName,Gcode FROM GAMES;
(ii) SELECT * FROM GAMES WHERE PrizeMoney>7000;
(iii) SELECT * FROM GAMES ORDER BY ScheduleDate;
(iv) SELECT SUM(PrizeMoney),Number FROM GAMES GROUP BY Number;
(v) 2
(vi) 19-Mar-2004 12-Dec-2003
(vii) 59000
(viii) 101
103
108

Q2. Consider the following tables FACULTY and COURSES. Write SQL commands for the statements (i) to (v) and give outputs for SQL queries (vi) to (vii).

FACULTY

| F_ID | Fname | Lname | Hire_date | Salary |
|---|---|---|---|---|
| 102 | Amit | Mishra | 12-10-1998 | 12000 |
| 103 | Nitin | Vyas | 24-12-1994 | 8000 |
| 104 | Rakshit | Soni | 18-5-2001 | 14000 |
| 105 | Rashmi | Malhotra | 11-9-2004 | 11000 |
| 106 | Sulekha | Srivastava | 5-6-2006 | 10000 |

COURSES

| C_ID | F_ID | Cname | Fees |
|---|---|---|---|
| C21 | 102 | Grid Computing | 40000 |
| C22 | 106 | System Design | 16000 |
| C23 | 104 | Computer Security | 8000 |
| C24 | 106 | Human Biology | 15000 |
| C25 | 102 | Computer Network | 20000 |
| C26 | 105 | Visual Basic | 6000 |

i) To display details of those Faculties whose salary is greater than 12000.
ii) To display the details of courses whose fees is in the range of 15000 to 50000 (both values included).

iii) To increase the fees of all courses by 500 of “System Design” Course.
iv) To display details of those courses which are taught by ‘Sulekha’ in descending order of courses.
v) Select COUNT (DISTINCT F_ID) from COURSES;
vi) Select Fname, Cname from FACULTY, COURSES where COURSES.F_ID =FACULTY.F_ID;
Ans.: (i) Select * from faculty where salary > 12000;
(ii) Select * from Courses.where fees between 15000 and 50000;
(iii) Update courses set fees = fees + 500 where Cname = “System Design”;
(iv) Select * from faculty fac, courses cour where fac.f_id = cour.f_id and fac.fname = 'Sulekha'order by cname desc;
(v) 4
(vi)

| Fname | Cname |
|---|---|
| Amit | Grid Computing |
| Rakshit | Computer Security |
| Rashmi | Visual Basic |
| Sulekha | Human Biology |

2- Marks Questions
Define the following terms with example:
(i) DDL (ii) DML (iii) Primary Key (iv) Candidate Key
(v) Alternate Key (vi) Foreign Key (vii) Cardinality of relation (viii) Degree of relation
(ix) Relation (x) Attribute (xi) Tuple (xii) Selection
(xiii) Projection

# UNIT 4 SOCIETY, LAW AND ETHICS (SLE-2)

## CHAPTER 14: SOCIETY, LAW AND ETHICS

**Introduction**
Information forms the intellectual capital for a person. Some ethical issues involved with the usage and availability of information are:

i. Intellectual property rights
ii. Plagiarism
iii. Digital property rights

**Intellectual property rights**
These are the rights of the owner of information to decide how much information is to be exchanged, shared or distributed. Also it gives the owner to decide the price for doing (exchanging/sharing/distributing) so.
The intellectual property rights must be protected because:

i. Ensures new ideas and technologies are widely distributes
ii. Encourages individuals and business to create new software and improve the existing application.
iii. Promotes investment in the national economy

**Plagiarism**
It is stealing someone else’s intellectual work such as idea, literary work or academic work etc. and representing it as your own work without giving credit to creator or without citing the source of information.
**Digital right management**
It is used to protect your software from being scraped for source code using decompilers etc.

- Digital property (digital assets)

It refers to any information about you or created by you that exists in digital form, either online or on an electronic storage **device.**

- Measures to protect digital property
  a. Anti-temper solution
  b. Legal clauses
  c. Limit the sharing of software code

**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 provide 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.

- Creative commons: Creative Commons (CC) is an internationally active non-profit organization to provide free licenses for creators to use it when making their work available to the public in advance under certain conditions. CC licenses allow the creator of the work to select how they want others to use the work. When a creator releases their work under a CC license, members of the public know what they can and can't do with the work.
- General Public License: 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 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.
- Apache License: The Apache License is a free and open source software (FOSS) licensing agreement from the Apache Software Foundation (ASF). The main features are copy, modify and distribute the covered software in source and/or binary forms, all copies, modified or unmodified, are accompanied by a copy of the license.

**Open Source**

Open source means any program whose source code is made available publically for use or modification as users or other developers see fit. Open source software is usually made freely available.

Eg: Open source software: python, java, linux, mongodb etc

Open data

Open data is data which can be accessed, used and shared by anyone to bring about social, economic and environmental benefits. Open data becomes usable when made available in a common, machine-readable format.

- Open source terminologies and definitions:
  a. Free Software: They are freely accessible and can be freely used, changed, improved, copied and distributed by all and payments are not needed for free Software.
  b. Open Source Software: Software whose source code is available to the user and it can be modified and redistributed without any limitation .OSS may come free of cost but nominal charges have to be paid for support of Software and development of Software.
  c. Proprietary Software: Proprietary Software is neither open nor freely available, normally the source code of the Proprietary Software is not available but further distribution and modification is possible by special permission by the developer.
  d. Freeware: Freeware are the software freely available, which permit redistribution but not modification (their source code is not available). Freeware is distributed in Binary Form (ready to run) without any licensing fees.
  e. Shareware: Software for which license fee is payable after some time limit, its source code is not available and modification to the software are not allowed.

➢ Privacy

It is the protection of personal information given online.

Online fraud

Fraud committed using the internet is called online fraud. Online fraud occurs in many forms such as non-delivered goods, non-existent goods, stealing information, fraudulent payments.

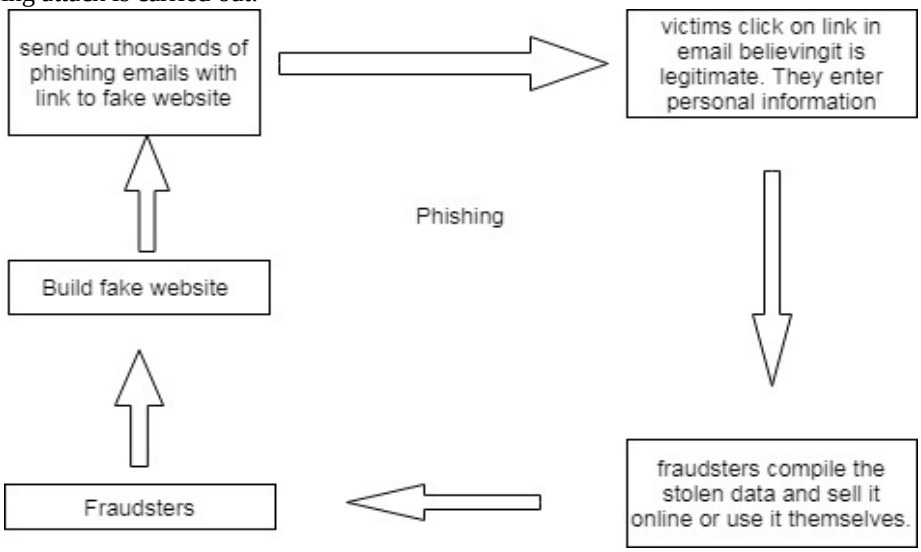
- Preventive measures to stop online fraud
  a. Strong security mechanism by the e-commerce site and payment gateways to prevent stealing of crucial information.
  b. Official guidelines and safeguards on the selling of users's data to third parties.
  c. A monitoring official body that ensures the delivery of goods/services as promised.

**Cybercrime**

Any criminal offense that is facilitated by the use of electronic device, computer or internet is called cybercrime. Eg: Information Theft, scams, illegal downloads etc.

- Phishing

It is the practice of attempting to acquire sensitive information from individuals over the internet by means of deception. Figure shows how phishing attack is carried out.




- **Scams**

  Any fraudulent business practice that extracts money from an unsuspecting, ignorant person is called scams.

  Measures to avoid online scams

  i. Never enter personal information or any financial information on unsecure website.
  ii. Never replays to emails from any unknown or unreliable source.
  iii. Never respond to an e-mail or advertising claiming you won something.
- **Illegal download**

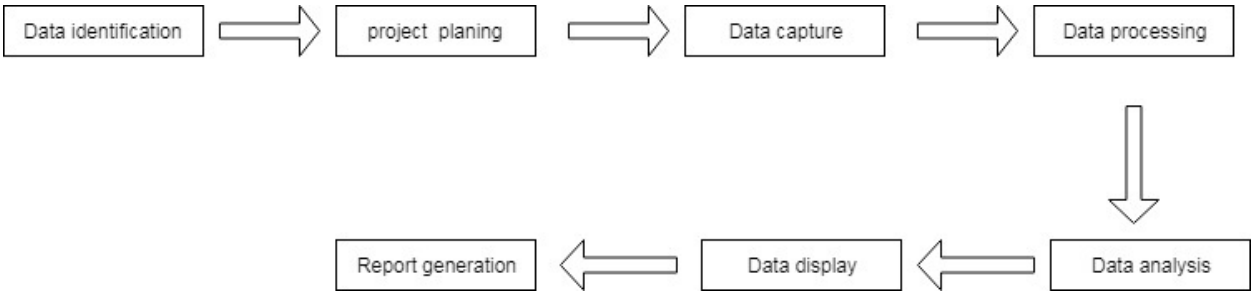
  Illegal downloading refers to obtaining files for which you don't have the right to use or download from the internet.
- **Child pornography**

  It is considered to be any depiction of a minor or an individual who appears to be a minor who is engaged in sexual or sexually related conduct. This includes pictures, videos, and computer-generated content. Even altering an image or video so that it appears to be a minor can be considered child pornography.

**Cyber forensics (digital forensics)**

It refers to methods used for interpretation of computer media for digital evidence.

**Digital forensic investigation process**




**IT Act 2000**

Cyber law refers to all the legal and regulatory aspects of internet and WWW. Cyber laws are enforced through IT Act 2000. The IT Act 2000 came into force on 17th October 2000. The primary purpose is to provide legal recognition to electronic commerce and to facilitate filing of electronic records with government. IT act 2000 was amended in 2008. Some sections under IT act 2000:

| 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 |

**Technology and society**

Technology affects the way individuals communicate, learn, and think. Technology has both positive and negative effects on society including the possible improvement or declination of society. Society is defined as, "the sum of social relationships among human beings" and technology is defined as, "the body of knowledge available to a civilization that is of use in fashioning implements, practicing manual arts and skills, and extracting or collecting materials." Technology shapes our society and has both positive and negative effects.

Societal issues and cultural changes induced by technology

- Social issues
  - Identity Theft
  - Cyber Bullying
  - Gaming Addiction
  - Privacy
  - Health & Fitness
  - Education
  - Terrorism & Crime
  - Communication Breakdown
  - Defamation of Character
- Cultural changes

  Technology has completely changed our culture from our values, to our means of communication. Now, many people have trouble having a face to face conversation, When people spend time with friends, its on their phones, Tablets, Or computers. Also, now people judge others by how their car is, Or if they have the newest iPhone or Tablet. Most people want to put their headphones in and listen to music rather than listening to another person. Videogames isolate all things from the world. Most people prefer technology today, just because that is all they know. Today it's all about touch screen cell phones. Technology just isolates people from reality. People now a day don't know how to communicate in real world situations like personal relationships, Problem solving and exhibiting adult behaviors.

**E-waste management**

- E- Waste:- It is defined as discarded computers, office electronic equipment, mobile phones etc.
- E-waste disposal process:-
  1. Dismantling
  2. Segregation of ferrous metal, non-ferrous metal and plastic
  3. Refurbishment and reuse

4. Recycling/recovery of valuable materials
5. Treatment/disposal of dangerous materials and waste

- **E-waste recycling- Benefits**
  1. Allows for recovery of valuable precious metals
  2. Protects public health and water quality
  3. Creates jobs
  4. Toxic waste
  5. Saves landfill space

**Identity theft**

It is the theft of personal information in order to commit fraud.

- Measures to prevent identity theft
  1. Protect personal information
  2. Use unique Ids to protect your devices and accounts
  3. Use Bio-metric protection
- Unique Ids- To protect your accounts and devices use unique Ids

  Following are the best practices for generating unique Ids
  - Avoid names, address, and birthdates for login credentials
  - Make password hard to guess
  - Make sure the password contains capital letters, small letters and special characters
  - Do not use same password for multiple account
- Biometrics

  Biometrics is any metrics related to human physical features such as your voice waves, fingerprint, iris pattern etc. To prevent identity theft, biometric protection can use.

**Gender issues while teaching/using computer**

- Issues
  1. Under representation
  2. Not girl-friendly work-culture
- Factors that attributed under representation
  1. Preconceived notions
  2. Lack of interest
  3. Lack of motivation
  4. Lack of role models
  5. Lack of encouragement in class
- Possible solutions
  1. There should be more initiatives and programmes that encourage girls to take up computer science subject.
  2. In the practical rooms, girls should be encouraged more to work on computer on their own and also to find solutions to their routine problems.
  3. The film and TV censor board should ensure fair representation of female role models in TV, cinema etc. so that more girls get encouraged to take up computer science.

**Disability issues while teaching and using computers**

- Issues
  1. Unavailability of teaching materials/Aids
  2. Lack of special need teachers
  3. Lack of supporting curriculum
- Possible solution
  1. Schools must work towards making available the required teaching aids/ materials to fulfill special needs of students with disabilities.

2. School must employ special needs teachers and should also train other teachers about how to interact with students with special needs.

Expansion of commonly used terms

| | |
|---|---|
| IPR | Intellectual property right |
| FOSS | Free and open source software |
| GPL | General public license |
| OSS | Open source software |
| FSF | Free software foundation |
| DRM | Digital Rights Management |

**Questions**

Q1. Which of the following can be termed as intellectual property – Washing Machine, Music Composition, Mixer Grinder, Email account?

Ans: Music Composition, Email Account

Q2. Give any two examples of Digital Property.

Ans:

1. Online personal account such as email, communication account, social media account, shopping accounts, online storage accounts.
2. Intellectual Property including copyright material, trademarks, patents and any software or code that a programmer may have written and own etc.

Q3. In a multi-national company Mr. A steals Mr. B's intellectual work and representing it as A's own work without citing the source of information, which kind of act this activity be termed as?

Ans: Plagiarism

Q4. How users of cyber world can safe personal information online?

Ans:

1) Use of Unique Ids to protect personal account and devices.
2) Apply Bio-metric protection to safe the personal information.

Q5. List some disability issues faced in the teaching/using computers with respect to especially abled students.

Ans:

1. Unavailability of Teachers Materials/Aids
2. Lack of Special Needs Teachers
3. Lack of Supporting Curriculum

Q6. Posing as someone else online and using his/her personal or financial information shopping online or posting something is common types of cybercrime these days.

a. What are such types of cybercrimes commonly called?
b. What measures can you take to stop these?

Ans:

a. online fraud
b. i. Strong security mechanism by the e-commerce site and payment gateways to prevent stealing of crucial information.
   ii. Official guidelines and safeguards on the selling of users's data to third parties.
   iii. A monitoring official body that ensures the delivery of goods/services as promised.

Q7. Why intellectual property rights be protected?

Ans:

i. Ensures new ideas and technologies are widely distributes

ii. Encourages individuals and business to create new software and improve the existing application.
iii. Promotes investment in the national economy

Q8.Name some threats to computer security.

Ans: Snooping, Identitytheft, Phishing, Virus and Trojans, Childpornography, etc.
Q9. When did IT act came into force?
Ans: 17th October 2000

**Previous year board questions and answers**

1. Does Open source software only mean that the software is free of cost? Give 2 reason for your answer.
   Ans: No, it does not only mean that the software is free of cost. Reason: It also means that the source code is available to user with freedom to use, modify and distribute.
2. Name the devices:
   This device constantly looks at all the data entering and exiting your connection. It can block or reject data in response to an established rule.
   Ans: Firewall
3. Write two examples each of software in the following categories:
   i. Open Source Operating System ii. Open Source Web Browser
   Ans: i. Linux, Android, FreeBSD, OpenBSD, NetBSD, DragonFly BSD, OpenSolaris, illumos, AuroraUX, Darwin, OpenDarwin, MINIX, FreeRTOS, FreeDOS etc
   ii. Mozilla Firefox, Google Chrome, Opera, QupZilla, Midori etc
4. Out of the following, which all comes under cyber crime?
   (i) Stealing away a brand new hard disk from a showroom.
   (ii) Getting in someone's social networking account without his consent and posting on his behalf.
   (iii) Secretly copying data from server of an organization and selling it to the other organization.
   (iv) Looking at online activities of a friend’s blog.
   Ans: (ii) & (iii)
5. What is the meaning of ‘Open source’ in the term ‘Open Source Database Management System’?
   Ans: Open source means that the software can be studied, copied, redistributed freely and even modified according to one's need without seeking any kind of permission. In order to modify such software the developers also provide the source code to the users.
6. List 2 measures to secure a network.
   Ans: Measures to secure a network are:
   (i) Login Password (ii) Firewall (iii) Anti Virus Software (iv) File Permissions

**KENDRIYA VIDYALAYA SANGATHAN**

# SAMPLE PAPER - 1

**CLASS XII COMPUTER SCIENCE (083)**

**TIME: 3hrs** **M.M:70**

***Instructions:***

***i. All Questions are Compulsory.***
***ii. Programming Language: Python***

| | | | |
|---|---|---|---|
| 1 | (a) | Identify type of tokens: if,file123,while,class_X | 2 |
| | Ans | if: keyword<br>file123:identifier<br>while: keyword<br>class_X: identifier | |
| | | (1/2 mark for each correct data type) | |
| | (b) | Name the python library module which need to be imported to run the following program:<br>print (sqrt(random.randint(1,16) | 1 |
| | Ans | math, random | |
| | | (1/2 mark for each correct answer) | |
| | (c ) | Rewrite the following code in python after removing all syntax error(s). Underlining each correction done in the code.<br>30=x<br>For I in range(2,6)<br>if x>30:<br>print(“true”) else<br>Print(“False”) | 2 |
| | Ans | x=30<br>for I in range(2,6):<br>if x>30:<br>print(“true”)<br>else:<br>print(“False”) | |
| | | (1/2 mark for each correction not exceeding 2 marks)<br>Or | |

| | | | |
|---|---|---|---|
| | | ( 1 mark for identifying the errors, without suggesting correction) | |
| | (d) | Find and write the output of the following python code:<br>Msg="CompuTer" Msg1="<br>for i in range(0, len(Msg)):<br>if Msg[i].isupper():<br>Msg1=Msg1+Msg[i].lower()<br>elif i%2==0:<br>Msg1=Msg1+'*'<br>else:<br>Msg1=Msg1+Msg[i].upper()<br>print(Msg1) | 2 |
| | Ans | cO*P*t*R | |
| | | (2 mark for correct answer and ½ mark for partially correct answer) | |
| | (e) | Find and write the output of the following python code:<br>def Alter(x,y=20):<br>x=x*y<br>y=x%y<br>print (x,'*',y)<br>return (x)<br>a=200<br>b=30<br>a=Alter(a,b)<br>print (a,'$',b)<br>b=Alter(b)<br>print (a,'$', b)<br>a=Alter(a)<br>print (a,'$',b) | 3 |
| | Ans: | 6000 * 0<br>6000 $ 30<br>600 * 0<br>6000 $ 600 | |

| | | | |
|---|---|---|---|
| | | 120000 * 0<br><br>120000 $ 600 | |
| | | ½ marks for each correct line of output<br><br>Deduct ½ marks for not writing '*'and '$' symbol correctly | |
| | (f) | What possible outputs are expected to be displayed on the screen at the time of execution of the program from the following code? Also specify the minimum and maximum values that can be assigned to the variable c.<br>import random<br>temp=[10,20,30,40,50,60]<br>c=random.randint(0,4)<br>for i in range(0, c):<br>  print(temp[i],"#")<br>(i)10#20# (ii) 10#20#30#40#50#<br>(iii) 10#20#30# (iv) 50#60# | 2 |
| | Ans | (i) & (iii) Minimum value of C is 0 and Maximum value is 3 | |
| | | 1/2 mark for writing each correct answer not exceeding 1<br><br>½ mark for minimum value of c<br><br>½ mark for maximum value of c | |
| 2 | (a) | Write a recursive function to calculate the Fibonacci Series up to n terms. | 2 |
| | Ans | def Fibo(n):<br><br>if n<=1:<br><br>  return n<br><br>else:<br><br>  return (Fibo(n-1)+Fibo(n-2)) | |
| | | ½ mark for declaration of correct function header and 1.5 mark for logic | |
| | (b) | Write a statement in python to open a text file REWRITE.TXT so that new content can be read or written from it. | 1 |
| | Ans | file=open("REWRITE.TXT", "w") Or<br>file=open("REWRITE.TXT", "w+") | |
| | | Or<br>file=open("REWRITE.TXT", "r") | |
| | | 1 mark for correct statement | |
| | (c) | A text file "Quotes.Txt" has the following data written in it:<br><br>Living a life you can be proud of<br><br>Doing your best<br><br>Spending your time with people and activities that are important to you<br>Standing up for things that are right even when it's hard Becoming the best | 2 |

| | | | |
|---|---|---|---|
| | | version of you<br><br>Write a user defined function to display the total number of words present in the file. | |
| | Ans: | def countwords():<br>S=open("Mydata", "r")<br><br>f=S.read()<br><br>z=f.split()<br><br>count=0<br><br>for I in z:<br><br>count=count+1<br><br>print("Total number of words",count)<br><br>(½ mark for reading the file using read)<br><br>(½ mark for correctly using split())<br><br>(½ mark for the correct loop)<br><br>(½ mark for displaying the correct value of count) | |
| 3 | (a) | Consider the following unsorted list<br><br>95 79 19 43 52 3<br><br>Write the passes of bubble sort for sorting the list in ascending order till the 3rd iteration. | 2 |
| | Ans | [79, 19, 43, 52, 3, 95]<br><br>[19, 43, 52, 3, 79, 95]<br><br>[19, 43, 3, 52, 79, 95]<br><br>(2 mark for all correct iteration in sequence.) | |
| | (b) | Name the function that you will to create a line chart and Pie Chart. | 1 |
| | Ans | matplotlib.pyplot.plot()<br><br>matplotlib.pyplot.pie() | |
| | | ½ mark for each correct function | |
| | (c ) | Define Big-O notation. State the two factors determine the complexity of algorithm. | 2 |
| | Ans | It is used to depict an algorithm's growth rate. The growth rate determines the algorithm's performance when its input size grows. Through Big-O, the upper bound of the algorithm's performance is specified.<br><br>Internal Factors: a) Time required to run b) Space of memory required to run<br><br>External Factor: a) Size of the input b) Speed of computer c) Quality of the computer | |
| | | 1 mark for definition and 1 mark for factor satement | |
| | (d) | Calculate the time complexity of the Insertion sort. | 2 |

```
aList=[15,6,13,22,3,52,12]  # takes constant time say c0
print('Original list if ', aList) #takes constant time say c1
n=len(aList) # takes constant time say c2
for i in range(1, n):   # takes constant time say c3 and repeats n times
key=aList[i]  # takes constant time say c4
j=i-1    # takes constant time say c5
while j>=0 and key<aList[j]:   #takes constant time say c6 and repeats n times
```

Total time taken= c0+c1+c2+c10+n(c3+c4+c5+n(c6+c7+c8+c9))
=c0+c1+c2+c10+n(c3+c4+c5)+n2(c6+c7+c8+c9)
Time complexity= O(n2)

2 marks for correct answer with correct steps and 1 mark for correct answer

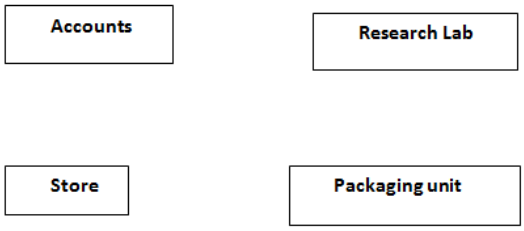
(e ) Evaluate the following postfix using stack & show the content of the stack of each: after the execution 20, 4, +, 3, -, 7, 1 — 2

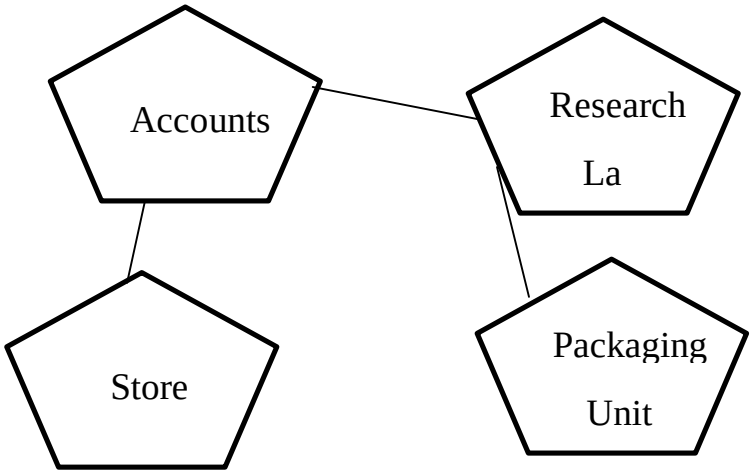
Ans

| S.no | Symbol | Operation | Stack | Result |
|---|---|---|---|---|
| 1 | 20 | Push(20) | 20 | |
| 2 | 4 | Push(4) | 20,4 | |
| 3 | + | Pop(4) | 20 | |
| 4 | | Pop(20) | | |
| | | Perform(20+4) | | |
| | | Push(24) | 24 | |
| 5 | 3 | Push(3) | 24,3 | |
| 6 | - | Pop(3) | 24 | |
| | | Pop(24) | | |
| | | Perform(24-3) | | |
| | | Push(21) | 21 | |
| 7 | 7 | Push(7) | 21,7 | |
| 8 | / | Pop(7) | 21 | |
| | | Pop(21) | | |
| | | Perform(21/7) | | |
| | | Push(3) | 3 | |
| 9 | | Pop(3) | | Result=3 |

[½ mark each for correctly evaluating expression up to each operator.]

| | | | |
|---|---|---|---|
| | | [½ mark for correct answer] | |
| | ( f) | Write functions to perform insert and delete operation in a Queue | 4 |
| | | def qins(Qu, item):<br>Qu.append(item)<br>if len (Qu)==1:<br>front=rear=0<br>else:<br>rear=len(Qu)-1<br>def qdel(Qu):<br>if isEmpty(Qu):<br>return 'Underflow'<br>else:<br>item=Qu.pop(0)<br>if len(Qu)==0:<br>front=rear=None<br>return item | |
| | | ½ mark for function header of each and 1.5 mark for correct logic of each | |
| 4 | (a) | Write the expanded name for the following abbreviated terms used in Networking and Communication:<br>(i)SMTP (ii) NFC (iii) FTP (iv) VoIP | 2 |
| | | (i) Simple mail transfer protocol (ii) Near Field Communication (iii) File transfer protocol (iv) Voice over internet protocol | |
| | | ½ marks for each correct answer | |
| | (b) | Daniel has to share the data among various computers of his two offices branches situated in the same city. Name the network (out of LAN, WAN, PAN and MAN) which is being formed in this process. | 1 |
| | Ans | MAN<br>(1 mark for correct answer) | |
| | (c ) | What are the enabling technologies of IoT system? | 1 |
| | Ans | RFID, Sensors, Smart Technologies, Efficient network connectivity | |
| | | ½ mark for two correct technology | |
| | (d) | What is CSMA/CA? How does it works? | 2 |

| | | | |
|---|---|---|---|
| | Ans | In CSMA/CA, as soon as a node receives a packet that is to be sent, it checks to be sure the channel is clear (no other node is transmitting at the time). If the channel is clear, then the packet is sent. If the channel is not clear, the node waits for a randomly chosen period, and then checks again to see if the channel is clear. This period is called the backoff factor, and is counted down by a backoff counter. If the channel is clear when the backoff counter reaches zero, the node transmits the packet. If the channel is not clear when the backoff counter reaches zero, the backoff factor is set again, and the process is repeated. | |
| | | 1 mark for definition and 1 mark for working | |
| | (e) | Rehaana Medicos Center has set up its new center in Dubai. It has four buildings as shown in the diagram given below:   | 4 |
| | | Distance between various building are as follows:<br><br>Accounts to research Lab — 55m<br>Accounts to store — 150m<br>Store to packaging unit — 160m<br>Packaging unit to research lab — 60m<br>Accounts to packaging unit — 125m<br>Store to research lab — 180m<br><br>Number of Computers<br><br>Accounts — 25<br>Research Lab — 100<br>Store — 15<br>Packaging Unit — 60<br><br>As a network expert, provide the best possible answer for the following queries:<br><br>i) Suggest a cable layout of connections between the buildings.<br>ii) Suggest the most suitable place (i.e. buildings) to house the server of this organization.<br>iii) Suggest the placement of the following device with justification: a) Repeater b) Hub/Switch<br>iv) Suggest a system (hardware/software) to prevent unauthorized access to or from the network. | |

| | | | |
|---|---|---|---|
| | Ans | (i) Layout<br>  <br><br>(1 mark for drawing any correct layout)<br>(ii)The most suitable place/ building to house the server of this organization would be building Research Lab, as this building contains the maximum number of computers. (1 mark for correct answer)<br>(iii) a) For layout1, since the cabling distance between Accounts to Store is quite large, so a repeater would ideally be needed along their path to avoid loss of signals during the course of data flow in this route. For layout2, since the cabling distance between Stores to Recresearch Lab is quite large, so a repeater would ideally be placed. b) In both the layouts, a Hub/Switch each would be needed in all the buildings to interconnect the group of cables from the different computers in each building. (½ mark for each correct answer)<br>(iv) Firewall (1 mark for correct answer) | |

| | | | |
|---|---|---|---|
| | (f) | Discuss how IPv4 is differs from IPv6. | 2 |
| | | An IP address is binary numbers but can be stored as text for human readers. For example, a 32-bit numeric address (IPv4) is written in decimal as four numbers separated by periods. Each number can be zero to 255. For example, 1.160.10.240 could be an IP address. IPv6 addresses are 128-bit IP address written in hexadecimal and separated by colons | |
| | | 1 mark for one difference | |
| | (g) | What is network congestion? What are its symptoms? | 2 |
| | | Just like in road congestion, Network Congestion occurs when a network is not able to adequately handle the traffic flowing through it. While network congestion is usually a temporary state of a network rather than a permanent feature, there are cases where a network is always congested signifying a larger issue is at hand. Symptoms: Excessive packet delay, Use of data packets, Retransmission | |
| | | 1 mark for definition and 1 mark for symptoms | |

| | | | |
|---|---|---|---|
| | (h) | Name any two network tools. | 1 |
| | | Ping, whois lookup | |
| | | ½ mark for each tool | |
| 5 | (a) | Define degree and cardinality. Based upon given table write degree and cardinality. | 2 |

PATIENTS

| PatNo | PatName | Dept | DocID |
|---|---|---|---|
| 1 | Leena | ENT | 100 |
| 2 | Supreeth | Ortho | 200 |
| 3 | Madhu | ENT | 100 |
| 4 | Neha | ENT | 100 |
| 5 | Deepak | Ortho | 200 |

Degree=4

Cardinality=5

1 mark for degree and 1 mark for cardinality

(b) Write SQL commands for the queries (i) to (iv) and output for (v) & (viii) based on a table COMPANY and CUSTOMER. 6

COMPANY

| CID | NAME | CITY | PRODUCTNAME |
|---|---|---|---|
| 111 | SONY | DELHI | TV |
| 222 | NOKIA | MUMBAI | MOBILE |
| 333 | ONIDA | DELHI | TV |
| 444 | SONY | MUMBAI | MOBILE |
| 555 | BLACKBERRY | MADRAS | MOBILE |
| 666 | DELL | DELHI | LAPTOP |

CUSTOMER

| CUSTID | NAME | PRICE | QTY | CID |
|---|---|---|---|---|
| 101 | Rohan Sharma | 70000 | 20 | 222 |
| 102 | Deepak Kumar | 50000 | 10 | 666 |
| 103 | Mohan Kumar | 30000 | 5 | 111 |
| 104 | Sahil Bansal | 35000 | 3 | 333 |

| | | |
|---|---|---|
| 105 | Neha Soni | 25000 | 7 | 444 |
| 106 | Sonal Aggarwal | 20000 | 5 | 333 |
| 107 | Arjun Singh | 50000 | 15 | 666 |

(i) To display those company name which are having price less than 30000.
(ii) To display the name of the companies in reverse alphabetical order.
(iii) To increase the price by 1000 for those customer whose name starts with 'S'
(iv) To add one more column totalprice with decimal(10,2) to the table customer
(v) SELECT COUNT(*) ,CITY FROM COMPANY GROUP BY CITY;
(vi) SELECT MIN(PRICE), MAX(PRICE) FROM CUSTOMER WHERE QTY>10;
(vii) SELECT AVG(QTY) FROM CUSTOMER WHERE NAME LIKE "%r%;
(viii) SELECT PRODUCTNAME,CITY, PRICE FROM COMPANY,CUSTOMER WHERE COMPANY.CID=CUSTOMER.CID AND PRODUCTNAME="MOBILE";

Ans: (i) Select name from customer where price <30000;

½ mark for writing correct select clause or 1 mark for writing correct query

(ii) Select name from company order by name desc.

½ mark for writing correct select clause or 1 mark for writing correct query

(iii) update customer set price=price+1000 where name like "S%"; ½ mark for writing correct update clause or 1 mark for writing correct query

(iv) alter table customer add totalprice decimal(10,2);

½ mark for writing correct alter clause or 1 mark for writing correct query

(v)

| count(*) | city |
|---|---|
| 3 | DELHI |
| 2 | MUMBAI |
| 1 | MADRAS |

½ mark for writing correct output

(vi)

| MIN(PRICE) | MAX(PRICE) |
|---|---|
| 50000 | 70000 |

½ mark for writing correct output

(vii)

| AVG(QTY) |
|---|
| 12 |

½ mark for writing correct output

(viii)

| PRODUCTNAME | CITY | PRICE |
|---|---|---|
| MOBILE | MUMBAI | 70000 |
| MOBILE | MUMBAI | 25000 |

| | | | | |
|---|---|---|---|---|
| | | ½ mark for writing correct output | | |
| 6 | (a) | What is secured data transmission? What technical ways are used to ensure the secure data transmission? | 2 | 6 |
| | Ans: | Secure transmission refers to the transfer of data such as confidential or proprietary information over a secure channel. Many secure transmission methods require a type of encryption.<br><br>Technical ways:<br><br>E-mail encryption. A number of vendors offer products that encrypt e-mail messages, are easy to use and provide the ability to send private data, including e-mail attachments, securely. ...<br>Web site encryption. ...<br><br>Application encryption. ...<br><br>Remote user communication. ...<br><br>Laptops and PDAs. ...<br><br>Wireless networks. | | |
| | | 1 mark for definition and 1 mark for technical ways | | |
| | (b) | Expand the terms:<br><br>a) GNU b) FLOSS | 2 | |
| | Ans: | a) GNU's not Unix b) Free Libre open source softwares | | |
| | | 1 mark for each correct answer | | |
| | (c ) | What is intellectual property? What do you understand by intellectual property right? | 2 | |
| | Ans: | Intellectual property (IP) refers to creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce.<br>A right that is had by a person or by a company to have exclusive rights to use its own plans, ideas, or other intangible assets without the worry of competition, at least for a specific period of time.<br><br>These rights can include copyrights, patents, trademarks, and trade secrets. | | |
| | | 1 mark for definition and 1 mark for definition of right | | |
| | (d) | What is cybercrime? Give example. | 2 | |
| | Ans: | Cybercrime is defined as a crime in which a computer is the object of the crime (hacking, phishing, spamming) or is used as a tool to commit an offense (child pornography, hate crimes). Cybercriminals may use computer technology to access personal information, | | |
| | | Business trade secrets or use the internet for exploitative or malicious purposes. Criminals can also use computers for communication and document or data storage. Criminals who perform these illegal activities are often referred to as hackers. | | |
| | | 1 mark for definition and 1 mark for example | | |
| | (e) | What is identity theft? | 2 | |

| | | | | |
|---|---|---|---|---|
| | Ans: | Identity theft, also known as identity fraud, is a crime in which an imposter obtains key pieces of personally identifiable information, such as Social Security or driver's license numbers, in order to impersonate someone else. | | |
| 7 | (a) | What is Django templates? | 2 | 7 |
| | Ans: | A Django template is a string of text that is intended to separate the presentation of a document from its data. A template defines placeholders and various bits of basic logic (template tags) that regulate how the document should be displayed. | | |
| | | 2 marks for correct answer | | |
| | (b) | Name the file data found in project web application folder. | 1 | |
| | Ans: | __init__.py, settings.py, urls.py, wsgi.py | | |
| | | ½ marks for two correct answer | | |
| | (c) | Identify the view functions from the following URL confs and write their function header.<br>a) path(‘home/’,views.main) b) path(‘home/check/’,views.newone)<br>c)path(‘check/’,views.onenew) d) path(‘check/home/’,views.core) | 2 | |
| | Ans: | a) def main(request):<br>b) def newone(request):<br>c) def onenew(request):<br>d) def core(request) | | |
| | | ½ marks for each correct answer | | |
| | (d) | What is database connectivity? Which package must be imported in python to create a database connectivity application? | 2 | |
| | Ans | Database connectivity refers to connection and communication between an application and the database system.<br>Package for connectivity:<br>Mysql.connector | | |
| | | 1 mark for definition and 1 mark for package | | |

# SAMPLE PAPER - 2

**CLASS XII COMPUTER SCIENCE (083)**

TIME: 3hrs M.M:70

1. (a) Name two mutable and immutable objects in Python language . (2)

Ans. int, float, bool, string, unicode, tuple are immutable objects in Python.Lists, dictionaries and sets are mutable.

(b) Identify and write the name of the module to which the following functions belong: (1)

(i) ceil () (ii) findall ()

Ans. (i) ceil ()–math module (ii) findall ()–read module

(c) Observe the following Python code very carefully and rewrite it after removing all syntactical errors with each correction underlined. (2)

```
DEF execmain ():
    x=input ("Enter a number :")
    if (abs(x)=x):
        print"You entered a positive number"else:
        x=*-1
        print"Number made positive:"xexecmain()
```

Ans.Correctedcode:

```
def execmain():
    x=input("Enter a number:")
    if(abs(x)==x):
        print("You entered a positive number")
    else:
        x*=-1
        print("Number made positive:",x)
execmain ()
```

(d) Find the output of the following: (2)

```
L1=[100,900,300,400,500]
START=1
SUM=0
For C in range (START, 4):
SUM=SUM+L1[C]
    print(C,":",SUM)
    SUM=SUM+L1[0]*10
    print(SUM)
```

Ans.Output is:

```
1:900
1900
2:2200
3200
3:3600
4600
```

(e) Write the output of the following Python program code: (3)

```
def ChangeList():
    L=[]
    L1=[]
    L2=[]
    for  in range(1,10):
    L.append(i)
    for  in range(10,1,–2):
    L1.append(i)
    for  in range(len(L1)):
```

```
        L2.append (L1 [i] + L[i])
        L2.append (len (L)-len (L1))
        print(L2)
    ChangeList()
```

Ans.Output is:

[11, 10, 9, 8, 7, 4]

(f) Study the following program and select the possible output(s) from the options (i) to (iv) following it. Also,write the maximum and the minimum values that can be assigned to the variable Y. (2)

(g)
```
import random
X=random.random()
Y=random.randint(0,4)
print(int(X),":",Y+int(X))
```

(i)0:0 (ii)1:6
(iii)2:4 (iv)0:3

Ans.(i) and (iv) are the possible outputs.Minimum value that can be assigned is–Y=0.Maximum value that can be assigned is–Y=3

2. (a)Explain operatoro verloading with the help of an example. (2)

Ans.Operator overloading is a feature in Python that allows the same operator to have a different meaning according to the context.It signifies giving extended meaning beyond the predefined operational meaning. For example, operator+is used to add two integers as well as joint strings and merge two lists.

For example,

```
>>print (44+2)
   46
#concatenate two strings
 Print ("Python"+"Programming")
>>PythonProgramming
#Product of two numbers
>>print (5*5)
      25
#Repeat the String
>>print ("Hello"*3)
    HelloHelloHello
```

(b) Find the output of following: (2)

```
colors=["violet","indigo","blue","green","yellow","orange","red"]delcolor[4]
colors.remove ("blue")
colors.pop (3)
print(colors)
```

Ans.Outputis:['violet','indigo','green','red']

(c) Find the output of the following: (2)

```
str="Python for beginners is easy to learn"
str2="easy"
print("The first occurrence of str2 is at:",end="")
print(str.find(str2,4))
print("The last occurrence of str2 is at:",end="")
print(str.rfind(str2,4))
```

Ans.Output is:

The first occurrence of str2 is at: 22 the last occurrence of str2 is at: 22

3.(a)Write the definition of a function Reverse(X) in Python to display the elements in reverse order such that each displayed element is twice of the original element(element*2) of the ListX in the following manner: (2)

Example:

If List X contains 7 integers as follows:

| X[0] | X[1] | X[2] | X[3] | X[4] | X[5] | X[6] |
|---|---|---|---|---|---|---|
| 4 | 8 | 7 | 5 | 6 | 2 | 10 |

After executing the function, the array content should be displayed as follows:

| | | | | | | |
|---|---|---|---|---|---|---|
| 20 | 4 | 12 | 10 | 14 | 16 | 8 |

Ans.

```
def Reverse(X):
    for  in range(len(X)-1,-1,-1):
        print (X[i]*2)
```

(b) Consider the following unsorted list: 95791943523. Write the passes of bubble sort for sorting the list in ascending order till the 3rd iteration. (3)

Ans.[79,19,43,52,3,95]
[19, 43, 52, 3, 79, 95]
[19, 43, 3, 52, 79, 95]

(c) Write a user-defined function to generate odd numbers between a and b(including b). (2)

Ans.
```
def generateodd (a,b):
    for  in range(a,b+1):
        if(i%2!=0):
            print(i)
```

(d) Observe the following code and answer the questions that follow: (1)

```
File=open("Mydata","a")_____________________#Blank1
File.close ()
```

(i) What type (Text/Binary) of file is Mydata?
(ii) Fill in Blank1with a statement to write“ABC”in the file“Mydata”.

Ans. (i) TextFile
(ii) File.write("ABC")

4. (a) Name the function use to create a (i) line chart (ii) bar chart. (2)

Ans. (i) matplotlib.pyplot.plot () (ii) matplotlib.pyplot.bar ()

(b) Write a function to perform insert operations on a Queue containing Members (MemberNo, MemberName, and Age) of membersnode (2)

Ans.
```
Q= []
def insert(Q,item):
  Q.append(item)
mno=int(input(“Enter Member No”))
mname=input(“Enter member name”)
mage=int(input(“Enter Age”))
item=[mno,mname,mage]
insert(Q,item)
```

5. (a)Write any one advantage and one disadvantage of Coaxial cable. (2)

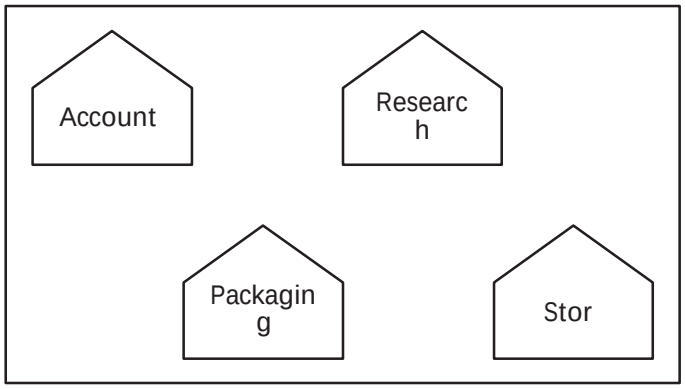
Ans.Advantages:

- It is less susceptible to noise or interference (EMIorRFI) as compared to twisted pair cable.
- It supports high bandwidth signal transmission as compared to twisted pair.
- It is easy to wire and easy to expand due to its flexibility.

Disadvantages:

- It is bulky.
- It is expensive to install for longer distances due to its thickness and stiffness.

(b) Riana Medicos Centre has setup its new centre in Dubai.It has four buildings as shown in the diagram given below: (4)




Distances between various buildings are as follows:

| | |
|---|---|
| AccountstoResearchLab | 55m |
| AccountstoStore | 150m |
| StoretoPackaging Unit | 160m |
| PackagingUnittoResearchLab | 60m |
| AccountstoPackagingUnit | 125m |
| StoretoResearchLab | 180m |

Number of computers:

| | |
|---|---|
| Accounts | 25 |
| Research Lab | 100 |
| Store | 15 |
| PackagingUnit | 60 |

As a network expert, provide the best possible answer for the following queries:

(i) Suggest the type of network established between the buildings.

Ans. LAN (LocalAreaNetwork)

(ii) Suggest the most suitable place (i.e., building) to house the server of this organization.

Ans.Research Lab as it has the maximum number of computers.

(iii) Suggest the placement of the following devices with justification:(a)Repeater(b)Hub/Switch

Ans.(a)Repeater:It should be placed between Accounts and PackagingUnit, Accounts to ResearchLab,Store to Research Lab and Accounts to PackagingUnit.

(c) Switch should be placed in each of the buildings for better traffic management.

(iv) Suggest a system (hardware/software) to prevent unauthorized access to or from the network.

Ans.Firewall.

(d) Expand the following: (2)

(i) VoIP

Ans.Voice over Internet Protocol

(ii) SMTP

Ans.Simple Mail Transfer Protocol

(iii) TDMA

Ans.Time Division Multiple Access

(iv) TCP/IP

Ans.Transmission Control Protocol/Internet Protocol

(e) The following is a 32-bit binary number usually represented as 4 decimal values, each representing 8 bits,in the range 0 to 255(known as octets) separated by decimal points. (1)

140.179.220.200

What is it? What is its importance?

Ans.It is an IPAddress.It is used to identify the computers on a network.

(f) Name the network tools used in the given situations: (4)

(i) To troubleshoot internet connection problems

Ans.ping

(ii) To see the IP address associated with a domain name

Ans.nslookup

(iii) To lookup registration record associated with a domain name.

Ans.whois

(iv) To test the speed of internet connection

Ans.speedtest.net

(g) What is a cloud? (1)

Ans.A cloud is a combination of networks, hardware, services, storage and interfaces that helps in delivering computing as a service.It has three users:

(i) End users

(ii) Business management users

(iii) Cloud service provider

(h) What are the effects of Network Congestion? (1)

Ans.Network congestion in data networking and queuing theory is the reduced quality of service that occurs when a network node or link is carrying more data than it can handle.Typical effects include

Queuing delay,packet loss or the blocking of new connections.

6.(a)Write the difference between GET and POST method. (1)

Ans.A web browser may be the client and an application on a computer that hosts a website may be the server.

So,to request a response from the server,therearemainlytwomethods:

(i) GET:to request data from the server

(ii) POST:to submit data to be processed to the server

(b) Write a MySQL-Python connectivity to retrieve data, on erecordatatime, from city table for employees with idles than10. (2)

Ans.import MySQLdb as mytry:

```
db=my.connect(host="localhost",user="root",passwd="",database="India")
cursor=db.cursor()
sql="select*fromcitywhereid<10"number_of_rows=cursor.execute(sql)print(cursor.fetchone())
#fetch the first row only db.close()
exceptmy.DataErrorase:
print("DataError")
print(e)
```

(c) What are the basic steps to connect Python with MYSQL using table Members present in the database‘Society’? (3)

Ans.import MySQLdb

```
conn=MySQLdb.connect(host=”localhost”,user=‘root’,password=‘’,
database=”Society”)
cursor=conn.cursor()
cursor.execute('SELECTCOUNT(MemberID)as count FROM MembersWHEREid=1')row=cursor.fetchone()
conn.close()print(row)
```

(d) What is the role of Django in website design? (1)

Ans.

Django is a high-level Python web frame work, designedy to help build complex web applications simply and quickly.Django make site as ier to build better web apps quickly and with lesscode.

(e)Write the steps to connect with database “testdb”with Python programming. (2)

Ans.Steps to be follow edare:

- Import my sql dbasdb
- Connect
- Cursor
- Execute

- Close

(f) Which method is used to retrieve all rows and single row? (1)

Ans. fetchall(),fetchone()

(g) Consider the table'empsalary'. (1)

| eid | esalary |
|---|---|
| 101 | 40000 |
| 102 | NULL |
| 104 | 51000 |
| 107 | NULL |

To select tuples with some esalary, Arun has written the following erroneous SQL statement:

SELECT eid, salary FROMempsalary WHERE esalary=something;

Write the correct SQL statement.

Ans.The correct SQL statementis:

SELECTeid, salary FROM empsalaryWHERE esalaryisNOTNULL;

(h) TableCOACHINGisshownbelow.WritecommandsinSQLfor(i)to(iii)andoutputfor(iv)and(v)(4)

| ID | NAME | AGE | CITY | FEE | PHONE |
|---|---|---|---|---|---|
| P1 | SAMEER | 34 | DELHI | 45000 | 9811076656 |
| P2 | ARYAN | 35 | MUMBAI | 54000 | 9911343989 |
| P4 | RAM | 34 | CHENNAI | 45000 | 9810593578 |
| P6 | PREMLATA | 36 | BHOPAL | 60000 | 9910139987 |
| P7 | SHIKHA | 36 | INDORE | 34000 | 9912139456 |
| P8 | RADHA | 33 | DELHI | 23000 | 8110668888 |

(i) Write a query to display name in descending order whose age is more than 23.

Ans.select name from coaching where age>23order by name desc;

(ii) Write a query to find the average fee grouped by age from customer table.

Ans. select avg(fee) from coaching group by age;

(iii) Write query details from coaching table where fee is between 30000 and40000.

Ans.Select*from coaching table where fee is between 30000 and 40000;

(iv) Select sum(Fee)from coaching where city like"%O%;

Ans.94000

(v) Select name,cityfrom coaching group by age having count(age)>2;

Ans.Emptyset

7.(a)What are the proper methods and steps for the disposal of used electronic items? (1)

Ans.Explanationaboutanymethodslike:

- Landfilling
- AcidBath
- Incineration
- Recyclingofe-waste
- Reuseofelectronicdevices

(b) When did IT Actc ome in to force? (1)

Ans.17thOctober, 2000.

(c) Explain the gender and disability issues while using computers in the classroom. (1)

Ans. It has been seen in many studies that in many countries computer use in schools is dominated by men.

Female teachers have less regard for their skills and knowledge than their malecolleagues.Females know less about information technology, enjoy using the computer less than male students, and perceive more problems with software.

(d) How can were cyclee-waste safely? (2)

Ans. (i)Use a certifiede-waster ecycler.

(ii) Visitcivicinstitutions.Checkwithyourlocalgovernment, schools and universities for additionalr esponsible recycling

options.

(iii) Explore retail options.

(iv) Donate your electronics.

(e) Name some threats to computer security. (1)

Ans.• Snooping • Identity theft • Phishing

• Virus and Trojans • Childpornography,etc.

(f) What is meant by the term Cyber Forensics? (2)

Ans.Cyber forensics is an electronic discovery technique used to determine and reveal technical criminal evidence.It often involves electronic data storage extra action for legal purposes.Although still initsinfancy, cyber forensics is gaining traction as aviable way of interpreting evidence.Cyber forensics is also known as computer forensics.

(g) Write any two categories of cyber crime. (1)

Ans.Cyber crime encompasses a wide range of activities, butthese can generally be broken into two categories:

- Crimes that target computer networks or devices: Such types of crimes include viruses and denial-of-service (DoS) attacks.
- Crimes that use computer networks to advance other criminal activities: These types of crimes include cyber stalking, phishing and fraud or identity theft.

(h) How does phishing happen? (1)

Ans. Phishing is a fraudulent attempt to obtain sensitive information such as usernames,passwords, and credit card details (andmoney), often for malicious reasons,by disguisings a trustworthy entity in an electronic communication.Phishing is typically carried out byemail spoofing or instant messaging,and it often directs users to enter personal in formation at a fake website,the look and feel of which is identical to the legitimate one and the only differenceis the URL of the website in question.

(i) Define and name some open source software. (1)

Ans.GPl, Apache, CreativeCommons, MozillaFirefox, OpenOffice.org, etc.

(j) What are Intellectual Property Rights (IPR)? (1)

Ans.IPR is a general term covering patents, copyright, trademark, industrialdesigns, geographica lindications, layout design of integrated circuits, undisclosed information (tradesecrets) and new plant varieties.

# SAMPLE PAPER 3

**SUBJECT – COMPUTER SCIENCE**

**Time Allowed: 3 hours** **Maximum Marks : 70**

1. a) Which of the following can be used as valid variable identifiers (s) in Python? 2
   i) 4th Sum
   ii) Total
   iii) Number#
   iv) _Data

   Ans ii) Total iv)_Data

   b) Name the Python Library modules which need to be imported to invoke the following functions 1

   i) floor() ii) randint()

   Ans i) math ii) random

   c) Rewrite the following code in python after removing all syntax error(s).Underline each correction done in the code. 2

```
STRING =""WELCOME""
For S in range[0,7]:
Print STRING(S)
Print S+STRING
```

Ans

```
STRING ="WELCOME NOTE"
For S in range (0,7):
        Print (STRING[S])
        Print(S,STRING)
```

   d)Find and write the outpute of the following python code : 2

```
TXT =["20","50","30","40"]

CNT =3

TOTAL =0

For C in [7,5,4,6]:

T=TXT[CNT]

  TOTAL= float (T) + C

  Print (TOTAL)

  CNT- = 1
```

Ans : 47.0

35.0

54.0

26.0

e) Write the output of the following python code: 3

```
def ChangeList( ):\
```

```
 L=[]
L1=[]
L2=[]
For i in range (1,10):
 L.append(i)
For i in range( 10,1,-2):
 L1.append (i)
For i in range (len(L1)):
 L2.append(L1[i]+L[i])
L2.append(len(L)-len(L1))
Print (L2)
ChangeList( )
```

Ans:[11,10,9,8,7,4]

f) What are the possible outcome(s) executed from the following code ? Also specify the maximum and minimum values that can be assigned to variable N. import random 2

```
import random
NAV = [“LEFT”,”FRONT”,”RIGHT”,”BACK”]
NUM =randome .randint (1,3)
NAVG = “ ”
For C in range (NUM,1,-1)
  NAVG=NAVG + NAV[C]
 Print (NAVG)
```

| | |
|---|---|
| i) BACKRIGHT | (ii) BACKRIGHTFRONT |
| (iii) BACK | (iv) LEFTFRONTRIGHT |

Ans: (i) BACKRIGHT
Max value 3 and minimum value 1 for variable NUM

2.a)What will be the status of the following list after the First, Second and Third pass of the insertion sort method used for arranging the following elements in descending order? 2
22, 24, 64,34, 80, 431
Note: Show the status of all the elements after each pass very clearly underlining the changes.

| | 22 | 24 | -64 | 34 | 80 | 43 |
|---|---|---|---|---|---|---|
| Pass 1 | 24 | 22 | -64 | 34 | 80 | 43 |
| Pass 2 | 24 | 22 | -64 | 34 | 80 | 43 |
| Pass 3 | 34 | 24 | 22 | -64 | 80 | 43 |

b) Write definition of a method EvenSum(NUMBERS) to add those values in the list of NUMBERS, which are odd. 2

Ans:
```
def EvenSum(NUMBERS):
  n=len(NUMBERS)
      s=0
      for i in range(n):
        if (i%2!=0):
                s=s+NUMBERS[i]
print(s)
```

c) Write a method in python to write multiple lines of text contents into a text file myfile.txt 2

```
def write1():
  f = open("myfile.txt","w")
  while True:
    line = input("Enter line")
    f.write(line)
    choice = input("Are there more lines")
    if choice == "N":
      break
  f.close()
```

d) Write PUSH() and POP() methods in Python to add Names and delete names considering them to act as PUSH and POP operations in Stack 4

```
stack=list()

def display():

l=len(stack)

if l :

    print(stack[l-1],"-->TOP")
    for i in range(l-2,-1,-1):
      print(stack[i])
    else:
      print("Empty Stack") def
POP():
  if len(stack)==0:
    print("Empty stack")
else:

    ele=stack.pop()
    print("Deleted element is",ele)
    print("After deletion :\n") display()
def PUSH(Names):

stack.append(Names)

print(Names,"added")
display()
while True:
        print("1-add")
        print("2-Delete")
        print("3-Display")
        print("4-Exit")
```

```
        ch=int(input("choice"))
        if ch==1:
                Names=input("Enter Names")
                PUSH(Names)
        elif ch==2:
                POP()
        elif ch==3:
                display()
        elif ch==4:
                break
        else:
                print("Invalid")
```

e) Differentiate between file modes r+ and rb+ with respect to Python 2

r+ Opens a file for both reading and writing. The file pointer placed at the beginning of the file.
rb+Opensafileforbothreadingandwritinginbinaryformat.Thefilepointerplacedatthebeginningofthefile.

3.a)Consider a binary file "Emp.dat" containing details such as empno: ename:salary(separator':').Write a python function to display details of those employees who are earning between 20000 and 40000. 3

Ans:
```
fin=open("emp.dat")

x=fin.readline()

while x:

  data=x.split(":")

  if(float(data[2])>20000<30000):

        print(data)

  x=fin.readline()

fin.close()
```

b) Write a python program to copy file1.txt into file2.txt 2

Ans:
```
fin=open("file1.txt")

fout=open("file2.txt","w")

data=fin.read()

fout.write(data)

fin.close()

fout.close()
```

e) Read the code given below and answer the question:
F1=open("first.txt","w")
F1.write("Welcome") F1.close()
If the file contains "kvs" before execution, what will be the contents of file after execution of the above code 1

Ans:The file now contains only"Welcome"because when the file is opened in writing mode,it truncates the existing data in the file.

(a) Expand the following 2
(i)ICMP (ii)TDMA
(iii)TCP/IP (iv)VOIP

Ans: (i) Internet Control Message Protocol
**(ii)** Time Division Multiple Access

iii)Transfer Control Protocol/Internet Protocol

(iv)Voice Over Internet Protocol

b) Name the network tools used in the given situation 2

**(i)** To troubleshoot internet connection problem
**(ii)** To see the IP address associated with a domain name
**(iii)** To look up registration record associated with a domain name
**(iv)** To test the speed of internet connection

**(i)** ping
**(ii)** nslookup
**(iii)** whois
(iv) speedtest.net

c) Differentiate between communication using Optical Fiber and Ethernet Cable in context of wired medium of Communication technologies. 2

Ans: Optical Fibre

- VeryFast
- Expensive
- Immune to electromagnetic interference Ethernet

Cable-

- Slower as compared to Optical Fiber
- Less Expensive as compared to Optical Fiber
- Prone to electromagnetic interference

d) Name the protocol used to transfer files to and from a remote computer 1

Ans : Telnet

e)Daniel has to shared data among various computers of his two office branches situated in the same city.Name the network (out of LAN,MAN,PAN and WAN)which should be formed in this process. 1

Ans: MAN

f) What is cloud computing? What are the benefits? 2

Ans:Cloud computing is an internet based new age computer technology.It is then extstage technology that uses the cloud to provide the services when ever and wherever the user needs it.It provide same data to access several servers worldwide

The main benefits of cloud computing are

**(i)** Data backup and storage of data

**(ii)** Powerful server capabilities

**(iii)** Incremented productivity

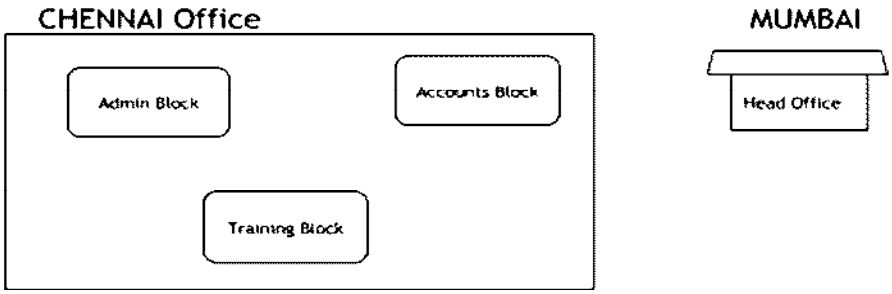
**(iv)** Very cost effective and timesaving software as a service known as Saas

g) Identify the following 140.178.112.120. What is its use? 1

Ans: It is an IP Address. It is used to identify computers in the network

f) Hi Standard Tech Training Ltd is a Mumbai based organization, which is expanding its office set-upto Chennai.At Chennai office compound, they are planning to have 3 different blocks for Admin, Training and Accounts related activities.Each block has a number of computers, which are required to be connected in a network for communication, data and resource sharing.

As a network consultant, you have to suggest the best network related solutions for them for issues/problems raised by them in (i) to (iv), as per the distances between various blocks/locations and other given parameters.




Shortest distances between various blocks/locations:

| | |
|---|---|
| Admin Block to Account Block | 300 Metres |
| Accounts Block to Training Block | 150 Metres |
| Admin Block to Training Block | 200 Metres |
| MUMBAI Head Office to CHENNAI Office | 1300 KM |

Number of computers installed at various blocks are as follows:

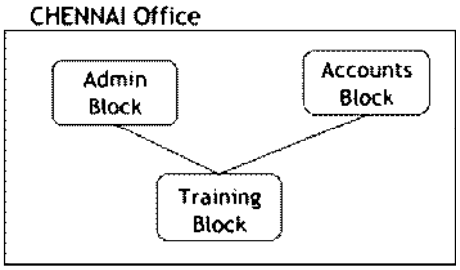
| | |
|---|---|
| Training Block | 150 |
| Accounts Block | 30 |
| Admin Block | 40 |

i) Suggest the most appropriate block/location to house the SERVER in the CHENNAI office (out of the 3 blocks) to get the best and effective connectivity. Justify your answer. 1

Ans: Training Block - Because it has maximum number of computers.

ii) Suggest the best wired medium and draw the cable layout (BlocktoBlock) to efficiently connect various blocks with in the CHENNAI office compound. 1

Ans: Best wired medium: Optical Fibre OR CAT5 OR CAT6 OR CAT7 OR CAT8 OR Ethernet Cable




iii) Suggest a device/software and its placement that would provide data security for the entire network of the CHENNAI office. 1

Ans: Firewall - Placed with the server at the Training Block OR
Any other valid device/software name

iv)Suggest a device and the protocol that shall be needed to provide wireless Internet access to all smartphone/laptop users in the CHENNAI office. 1

Ans: Device Name: WiFi Router OR WiMax OR RF Router OR Wireless Modem OR RF Transmitter
Protocol: WAP OR 802.16 OR TCP/IP OR VOIP OR MACP OR 802.11

5. Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii), which are based on the tables. 6

Table: VEHICLE Table: TRAVEL

| VCODE | VEHICLETYPE | PERKM |
|---|---|---|
| V01 | VOLVO BUS | 150 |
| V02 | AC DELUXE BUS | 125 |
| V03 | ORDINARY BUS | 80 |
| V05 | SUV | 30 |
| V04 | CAR | 18 |

| CNO | CNAME | TRAVELDATE | KM | VCODE | NOP |
|---|---|---|---|---|---|
| 101 | K.Niwal | 2015-12-13 | 200 | V01 | 32 |
| 103 | Fredrick Sym | 2016-03-21 | 120 | V03 | 45 |
| 105 | Hitesh Jain | 2016-04-23 | 450 | V02 | 42 |
| 102 | Ravi Anish | 2016-01-13 | 80 | V02 | 40 |
| 107 | John Malina | 2015-02-10 | 65 | V04 | 2 |
| 104 | Sahanubhuti | 2016-01-28 | 90 | V05 | 4 |
| 106 | Ramesh Jaya | 2016-04-06 | 100 | V01 | 25 |

**(i)** To display CNO, CNAME, TRAVELDATE from the table TRAVEL in descending order CNO.
Ans SELECT CNO, CNAME, TRAVELDATE FROM TRAVEL ORDER BY CNO DESC;
(ii) To display the CNAME of all the customers from the table TRAVEL who are traveling by vehicle with code V01orV02.
Ans SELECT CNAME FROM TRAVEL WHERE VCODE='V01'OR VCODE='V02';
OR
SELECT CNAME FROM TRAVEL WHERE VCODE IN ('V01', 'V02');
(iii) To display the CNO and CNAME of those customers from the table TRAVEL who travelled between '2015-12-31' and '2015-05-01'.
Ans SELECT CNO, CNAME from TRAVEL WHERE TRAVELDATE >= '2015-05-01' AND TRAVELDATE<= 15-12-31';
(iv) To display all the details from table TRAVEL for the customers, who have travel distance more than 120KM in ascending order of NOP.
Ans SELECT * FROM TRAVEL WHERE KM > 120 ORDER BY NOP;
(v) SELECT COUNT (*),VCODE FROM TRAVEL GROUP BY VCODE HAVIN GCOUNT(*)>1;

| COUNT(*) | VCODE |
|---|---|
| 2 | V01 |
| 2 | V02 |

(vi) SELECT DISTINC TVCODE FROM TRAVEL;

| DISTINCT VCODE |
|---|
| V01 |
| V02 |
| V03 |
| V04 |
| V05 |

Q6 (a) Write python-mysql connectivity to retrieve all the data of table student. 4

```
import mysql.connector
mydb=mysql.connector.connect(user="root",host="localhost",passwd="123",database="inservice")
mycursor=mydb.cursor()
mycursor.execute("select * from student") for x
in mycursor:
print(x)
```

b. What is the role of Django in website design 2
Django is a high-level python web framework, designed to help build complex web applications simply and quickly.Django makes it easier to build better web apps quickly and with lesscode.
c. Which method is used to retrieve all rows and single row? 1
Fetchall() ,fetchone()
d. Write the difference between GET and POST method . 2
A web browser may be the client and the application on a computer that hosts the website may be the server:
(i) GET: To request data from the server
(ii)POST: To submit data to be processed to the server
7. a. Explain the term 'Web beacons'? 2

Pictures in email messages also called Web beacons can be adapted to secretly send a message back to these-Spammersrely On information returned by these images to locate, active email addresses.

b. How does phishing happen? 2

Phishing is a fraudulent attempt to obtain sensitive information such as usernames, passwords, and creditcard details (and money), often formal malicious reasons, by disguising as a trustworthy entity in an electronic communication.Phishing is typically carried out by email spoofing or instant messaging, and it often directs users to enter personal information at a fake website,the look and feel of which is identical to the legitimate one and the only difference is the URL of the website in question

c. Write any two categories of cybercrime. 2

Cybercrime encompasses a wide range of activities, but these can generally be broken into two categories:

Crimes that target computer networks or devices: Such types of crimes include viruses and denial-of-service (DoS) attacks.

Crimes that use computer networks to advance other criminal activities:These types of crimes include cyber stalking, phishing and fraud or identity theft.

d. When did IT Act came into force 17th October 2000. 1

e. What is meant by the term Cyber Forensics? 2

Cyber forensics is an electronic discovery technique used to determine and reveal technical criminal evidence. It often involves electronic data storage extraction for legal purposes.Although still in its infancy, cyber forensics is gaining traction as a viable way of interpreting evidence. Cyber forensics is also known as computer forensics

f. What are Intellectual Property Rights (IPR)? 1

IPR is a general term covering patents, copyright, trademark, industrial designs, geographical indications, layout design of integrated circuits, undisclosed information (tradesecrets)and newplant varieties.

# SAMPLE PAPER 4

CLASS-XII SUBJECT-COMPUTER SCIENCE

MM-70 TIME-3HRS

Q1. (12*1=12)

i. What is the output of the following code :print 9//2

a.4 b. 4.5 c. 4.0 d. Error

ii. What is the output of the following program :

```
i = 0
while i < 3:
   print i
i++
            print i+1
```

(a)0 2 1 3 2 4 (b) 0 1 2 3 4 5 (c) 1 0 2 4 3 5 (d) Error

iii. What is the output of the following code :

```
L = ['a','b','c','d']
print "".join(L)
```

(a) None (b) abcd (c) [‘a’,’b’,’c’,’d’] (d) Error

iv. Which of the following is the use of id() function in python?

(a) id returns the identity of the object
(b) Every object doesn’t have a unique id
(c) Both (a) and (b)
(d) None of the above

v. Suppose list1 is [3, 4, 5, 20, 5, 25, 1, 3], what is list1 after list1.pop(1)?

(a) [3, 4, 5, 20, 5, 25, 1, 3]
(b) [1,3,3, 4, 5, 20, 5, 25]
(c) [3, 5, 20, 5, 25, 1, 3]
(d) [1, 3, 4, 5, 20, 5, 25,]

vi. What is the output of the following program :print "Hello World"[::-1]

(a)dlroWolleH (b) Hello Worl (c) d (d) Error

vii. Given a string s = “Welcome”, which of the following code is incorrect?

(a)print s[0] (b) print s.lower() (c) s[1]=’r’ (d) print s.strip()

viii. What is the output of the following program :

```
def myfunc(a):
    a = a + 2
    a = a * 2
    return a
print myfunc(2)
```

(a) 8 (b) 16 (c) Indentation Error (d) Runtime Error

ix. What is the output of the following code :

```
L = ['a','b','c','d']
print "".join(L)
```

(a) None (b) abcd (c) [‘a’,’b’,’c’,’d’] (d) Error

x. Which of the following is the use of id() function in python?

(a) id returns the identity of the object
(b) Every object doesn’t have a unique id
(c) Both (a) and (b)
(d) None of the above

xi. Suppose list1 is [3, 4, 5, 20, 5, 25, 1, 3], what is list1 after list1.pop(1)?

a) [3, 4, 5, 20, 5, 25, 1, 3]
b) [1,3,3, 4, 5, 20, 5, 25]
c) [3, 5, 20, 5, 25, 1, 3]
d) [1, 3, 4, 5, 20, 5, 25,]

xii. What is the output of the following program :print "Hello World"[::-1]

(a)dlroWolleH (b) Hello Worl (c) d (d) Error

Q2. (2+2+2+4+2=10)

(a) Write the definition of a function reverse(X) in Python to display the elements in reverse order such that each displayed element is twice of the original element of the list X. For example:
if the input List X is [4,8,7,5,6,11,10] then the function produces output as –
20, 22, 12, 10, 14, 16, 8 (2)

(b) Write a user defined function GenNum(a, b) to generate odd numbers between a and b (including b) (2)

(c) Give output of the following: (2)

```
def ChangeLst():
    L=[]
    L1=[]
    L2=[]
    for i in range(1,10):
        L.append(i)
    for i in range(10,1,-2):
        L1.append(i)
    for i in range(len(L1)):
        L2.append(L1[i]+L[i])
    print(L2)
ChangeLst()
```

(d) Write functions to perform insert (Enqueue) and delete (Dequeue) operations in a Queue containing Member details as given in the following definition of item node: - (4)

| Member No Integer, Member Name String, Age Integer |
|---|

(e) Evaluate the following Postfix notation: - (2)

50,60,+,20,10,-,*

3. (a) Observe the following code and answer the questions that follow – (1)

```
File = open("Mydata","a")
_____________________ # statement 1
File.close()
```

(i) What type of file is Mydata

(ii) Fill in the blank with statement to write “ABC” in the file

(b )Write a user defined function in Python that displays number of lines starting with 'H' present in the text file Poem.txt. (3)

Q.4(a) What do the underlined areas represent in the MAC address - (1)

10:B5:03:63:2E:FC

(b) What is the difference in working of switches and routers? (2)

(c) Define the term Cloud in context of Internet. Give some examples. (2)

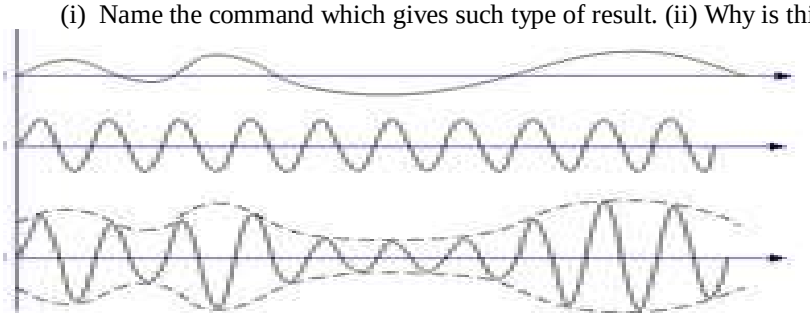
(d) What is a URL? Identify the various parts of a URL in the example given below: (1)

http://encycle.msn.com/getinfo.styles.asp

(e) Look at the image given below and answer questions that follow : - (2)

```
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
Reply from 127.0.0.1: bytes=32 time<1ms TTL=128
```

(i) Name the command which gives such type of result. (ii) Why is this command used?



(f)- (2)

(1) What is the above image representing?

(2)Which device in the Internet terminology does modulation demodulation?

(g)Expand the terms: TCP, VoIP, SSL, NFC, IMAP, FTP, WiFi, HTTPS (4)

(h)What measures wireless networks employ to avoid collisions? (1)

5. (3+6+2+2+2)

(a) Write a MYSQL-Python connectivity code to retrieve one record at a time from table EMPLOYEES who live in 'Delhi'

(b) Consider the tables given below: -

STAFF

| StaffID | Name | Department | Gender | Experience |
|---|---|---|---|---|
| 1125 | Nihara | Sales | F | 12 |
| 1263 | Kartik | Finance | M | 6 |
| 1452 | Payal | Research | F | 3 |
| 236 | Aryan | Sales | M | 8 |
| 366 | Laxman | Finance | M | 10 |
| 321 | Krishna | Sales | M | 7 |

SALARY

| StaffID | Basic | Allowance | Comm |
|---|---|---|---|
| 1452 | 12000 | 1000 | 200 |
| 321 | 23000 | 2300 | 900 |
| 1125 | 32000 | 4000 | 100 |

| | | | |
|---|---|---|---|
| 236 | 12000 | 52000 | 800 |
| 336 | 42000 | 1700 | 700 |
| 1263 | 18900 | 1690 | 150 |

With reference to the above table, write commands in SQL for (i) to (iv) and output for (v) to (viii)

(i) To display names of all staff that are in Sales department having experience less than 9 years and commission more than 700

(ii) Display average salary of staff working in Finance department. Salary= Basic+Allowance (iii)Display number of female members in each department.

(iv) Display name of employee earning maximum salary. Give Output

(v) SELECT NAME FROM STAFF ST, SALARY SA WHERE COMM <=700 AND ST.STAFFID = SA.STAFFID

(vi) SELECT NAME, BASIC FROM STAFF, SALARY WHERE DEPT="SALES" AND STAFF.STAFFID= SALARY.STAFFID

(vii) SELECT COUNT(DEPARTMENT),DEPARTMENT FROM STAFF GROUP BY DEPARTMENT

(viii) SELECT COUNT(*),GENDER FROM STAFF GROPU BY GENDER

(c) What are two types of HTTP requests? Write a view function that an process a GET request and display "main.html" as template. Assume that required files and methods are already imported.

(d) You have created a Django project folder. It contains 3 apps as: Register, Sell and Work. What will be the contents of Django project folder? List the folders (not files inside the folders)

(e) What is a Django template?

6. (2*5=10)

(a) "Privacy stands for protection of personal information given online. Especially in e-commerce, it is related to a company's policies on the use of user's data".

(i) Why is the above given statement important?

(ii) What is the need to safeguard user privacy?

(b) Expand the terms: FLOSS, SDLC, OSS, GNU

(c) Sumit downloaded XYZ software from the internet. After 2 weeks the software is asking Sumit to purchase a license for it to work at its best. In this context answer the questions – (i) XYZ comes under what category of software.

(iii) Can Sumit see the source code and also freely edit the software code of XYZ software?

(d) ABC has by online medium duped a person of 50 thousand rupees? What kind of crime is this and how will it be resolved?

(e) A producer has made a movie whose story line is completely based on a previous Hollywood movie. This producer did not take permission to make the movie based on this story. The writer of the story has now filed a case against this producer in court?

i. Which kind of offence is this?

ii. What are the consequences?

# SAMPLE PAPER 5

**CLASS-XII SUBJECT-COMPUTER SCIENCE**

**MM-70** **TIME-3 HRS**

1. (a) What is Default argument in a function? Explain with full programming example? 2

(b) What are Keyword (Named) arguments in a function? Explain with full programming example? 2

(C) Name the Python Library modules which need to be imported to invoke the following functions

(i)ceil() (ii)randint() 1

(c) Write a program to find the greater of two numbers using function and return the greater number? 2

(d) Consider the following function header: 2

```
def interest (prin,cc,time=2,rate=0.09):
        return prin*time*rate
```

Which function call is valid write with reason?

a. interest(rate=0.12,prin=5000,cc=4)

b. interest(5000,3,rate=0.05)

c. interest(rate=0.05,5000,3)

d. interest(500,time=2,rate=0.05)

(e) Write the output of the following code: 2

```
def increment(n):
    n.append([4,3])
    return n
L=[1,2,3,6]
M=increment(L)
print(L,M)
```

(f) Rewrite the following code in python after removing all syntax error(s). 2
Underline each correction done in the code

```
TEXT=""GREATDAY""
for T in range[0,7]:
    print TEXT(T)
print T+TEXT
```

(g) Find and write the output of the following Python code: 2

```
STR = ["90","10","30","40"]
COUNT = 3
SUM = 0
for I in [1,2,5,4]:
    S = STR[COUNT]
    SUM = float (S)+I
    print SUM
    COUNT-=1
```

2. (a) Write a method in Python to read lines from a text file DIARY.TXT, and display those lines, which are starting with an alphabet 'P'. 2

(b) What are the possible outcome(s) executed from the following code? Also specify the maximum and minimum values that can be assigned to variable N. 2

```
import random
NAV = ["LEFT","FRONT","RIGHT","BACK"]
NUM = random.randint(1,3)
NAVG = ""
for I in range(NUM,1,-1):
    NAVG = NAVG+NAV[I]
print NAVG
```

(i) BACKRIGHT (ii) BACKRIGHTFRONT
(iii) BACK (iv) LEFTFRONTRIGHT

3. (a) Write to create a pie for sequence con=[23.4,17.8,25,34,40] for zones=['East','West','North','South','Central']. 3

a. Show North zone's value exploded
b. Show % contribution for each zone
c. The pie chart should be circular

(b) Create multiline charts on common plot where three data ranges are plotted on same chart. The data range(s) to be plotted is/are:Data=[[5.,25.,45.,20.],[8.,13.,29.,27.],[9.,29.,27.,39.]] 2

(c) What is pyplot? Is it a python Library? 2

4. (a) What is linear list? 2

(b) Write a python function to insert an element in a stack of students(studentno,studentname) 2

5. (a) Write the difference between Client-Server and P2P? 2

(b)What is NIC? 1

(c) Discuss the role of following Devices in context of networking? 3

A. Router
B. Bridge
C. Gateway

(d) What are the full form of these: 2

A. HTTP
B. SSH
C. VoIP
D. IMAP

(e) What is the difference between amplitude and frequency modulation? 1
(f) What are protocols? What is the significance of protocols in networks? 2
(g) What is IoT? Explain? 2
(h) Write Short Note on the following:(any two) 2
a. Online Fraud
b. Intellectual Property rights
c. Phishing
d. Computer forensics

6. (a) Write SQL queries for (i) to (iv) and find outputs for SQL queries (v) to (viii), which are based on the tables : 6

**TABLE : SALESPERSON**

| Code | NAME | SALARY | ITCODE |
|---|---|---|---|
| 1001 | TANDEEP JHA | 60000 | I2 |
| 1002 | YOGRAJ SINHA | 70000 | I5 |
| 1003 | TENZIN JACK | 45000 | I2 |
| 1005 | ANOKHI RAJ | 50000 | I7 |
| 1004 | TARANA SEN | 55000 | I7 |

**TABLE : ITEM**

| ITCODE | ITEMTYPE | TURNOVER |
|---|---|---|
| I5 | STATIONARY | 3400000 |
| I7 | HOSIERY | 6500000 |
| I2 | BAKERY | 10090000 |

(i) To display the CODE and NAME of all SALESPERSON having “I7” Item Type Code from the table SALESPERSON.
(ii) To display all details from table SALESPERSON in descending order of SALARY.
(iii) To display the number of SALESPERSON dealing in each TYPE of ITEM.(Use ITCODE for the same)
(iv) To display NAME of all the salespersons from the SALES PERSON table along with their corresponding ITEMTYPE from the ITEM table.
(v) SELECT MAX(SALARY) FROM SALESPERSON;
(vi) SELECT DISTINCT ITCODE FROM SALESPERSON;
(vii) SELECT CODE,NAME, I.ITCODE FROM SALESPERSON S, ITEM I WHERE S.ITCODE=I.ITCODE AND TURNOVER>=700000;
(viii) SELECT SUM(SALARY) FROM SALESPERSON WHERE ITCODE=”I2”;

(b) What is the difference between having and where Clause? 2
(c) What is the purpose of settings.py in Django based web applications? 2
(d) What is the default port used by built in webserver of Dajngo? 2
(e) Write a view function that can process a GET request and display “main.html” as template. Import the required files () and method(s). 2
(f) What is Django? 1

7. (a) Define intellectual property rights? 2
(b) Explain digital forensic investigation process? 2
(c) List out some preventive measures against online frauds. 2
(d) What are the disabilities while teaching and using computers? 2
(e) What is e-waste management? 2

SET-4

Series BVM

Code No. **91**

Roll No. | | | | | | | |

Candidates must write the Code on the title page of the answer-book.

- Please check that this question paper contains **27** 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.

# COMPUTER SCIENCE

*Time allowed : 3 hours* *Maximum Marks : 70*

***General Instructions :***

*(i)* *SECTION A refers to programming language C++.*

*(ii)* *SECTION B refers to programming language Python.*

*(iii)* *SECTION C is compulsory for all.*

*(iv)* *Answer either SECTION A or SECTION B.*

*(v)* *It is compulsory to mention on the page 1 in the answer-book whether you are attempting SECTION A or SECTION B.*

*(vi)* ***All** questions are compulsory within each section.*

*(vii)* *Questions 2(b), 2(d), 3 and 4 have internal choices.*

## SECTION A
## [Only for candidates, who opted for C++]

**1.** (a) Write the names of any four fundamental data types of C++. *2*

(b) Write the names of the correct header files, which must be included in the following C++ code to compile the code successfully : *1*

```
void main()
{
   char L[]="CS 2018";
   int N=strlen(L);
   cout<<L[N-1];
}
```

(c) Rewrite the following **C++ program** after removing any/all syntactical error(s). Underline each correction done in the code : *2*

*Note :* Assume all required header files are already included in the program.

```
#define Area(L,B) = L*B
structure Recta
{
   int Length,Breadth;
};
void main()
{
   Recta R = [10,15];
   cout<<Area(Length.R,Breadth.R);
}
```

(d) Find and write the output of the following C++ program code : *2*

*Note :* Assume all required header files are already included in the program.

```
void Alter(char *S1, char *S2)
{
   char *T;
   T=S1;
   S1=S2;
   S2=T;
   cout<<S1<<"&"<<S2<<endl;
}
void main()
{
   char X[]="First", Y[]="Second";
   Alter(X,Y);
   cout<<X<<"*"<<Y<<endl;
}
```

(e) Find and write the output of the following C++ program code : *3*

*Note :* Assume all required header files are already included in the program.

```
void Convert(float &X, int Y=2)
{
   X=X/Y;
   Y=X+Y;
   cout<<X<<"*"<<Y<<endl;
}
void main()
{
   float M=15, N=5;
   Convert(M,N);
   Convert(N);
   Convert(M);
}
```

(f) Observe the following C++ code and find the possible output(s) from the options (i) to (iv) following it. Also, write the minimum and maximum values that can possibly be assigned to the variable **End**. *2*

*Note :*

- Assume all the required header files are already being included in the code.
- The function random(N) generates any possible integer between 0 and N-1 (both values included).

```
void main()
{
  randomize();
  int A[]={10,20,30,40,50,60,70,80};
  int Start = random(2) + 1;
  int End = Start + random(4);
  for(int I=Start; I<=End, I++)
     cout<<A[I]<<"$";
}
```

| | |
|---|---|
| (i) **10$20$30$** | (ii) **20$30$40$50$60$** |
| (iii) **30$40$50$60$** | (iv) **40$50$60$70$** |

**2.** (a) Given the following class Test and assuming all necessary header file(s) included, answer the questions that follow the code :

```
class Test
{
   int Marks; char TName[20];
public:
   Test(int M)                    //Function 1
   {
       Marks = M;
   }
   Test(char S[])                 //Function 2
   {
       strcpy(TName,S);
   }
   Test(char S[], int M)          //Function 3
   {
       Marks = M;
       strcpy(TName,S);
   }
   Test(Test &T)                  //Function 4
   {
       Marks = T.Marks + 10;
       strcpy(TName,T.TName);
   }
};

void main()
{
   Test T1(10);                     //Statement I
   Test T2(70);                     //Statement II
   Test T3(30, "PRACTICAL");        //Statement III
   ________________;                //Statement IV
}
```

(i) Which of the statement(s) out of (I), (II), (III), (IV) is/are incorrect for object(s) of the class Test ? *1*

(ii) What is Function 4 known as ? Write the **Statement IV**, that would execute **Function 4**. *1*

(b) Observe the following C++ code and answer the questions (i) and (ii).

*Note :* Assume all necessary files are included.

```
class Point
{
   int X,Y;
public:
   Point(int I=10, int J=20)    //Function 1
   {
       X = J;
       Y = I;
   }
   void Show()                  //Function 2
   {
       cout<<"Points are"<<X<<"&"<<Y<<endl;
   }
   ~Point()                     //Function 3
   {
       cout<<"Points Erased"<<endl;
   }
};

void main()
{
   Point P(5);
   P.Show();
}
```

(i) For the class Point, what is **Function 3** known as ? When is it executed ? *1*

(ii) What is the output of the above code, on execution ? *1*

**OR**

(b) Explain Polymorphism in context of Object Oriented Programming. Also give a supporting example in C++. *2*

(c) Write the definition of a class GRAPH in C++ with following description : *4*

Private Members

- **XUnit** // integer
- **YUnit** // integer
- **Type** // char array of size 20
- **AssignType()** /* Member function to assign value of Type based upon XUnit and YUnit as follows : */

| Condition | Type |
|---|---|
| XUnit = 0 Or YUnit = 0 | None |
| XUnit is more than YUnit | Bar |
| XUnit is less than or equal to YUnit | Line |

Public Members

- **InXY()** /* Function to allow user to enter values of XUnit and YUnit and then invoke AssignType() to assign value of Type */
- **OutXY()** // Function to display XUnit, Yunit and Type

(d) Answer the questions (i) to (iv) based on the following : *4*

```
class Ground
{
   int Rooms;
protected:
   void Put();
public:
   void Get();
};

class Middle : private Ground
{
   int Labs;
public:
   void Take();
   void Give();
};

class Top : public Middle
{
   int Roof;
public:
   void In();
   void Out();
};

void main()
{
   Top T;
}
```

(i) Which type of Inheritance out of the following is illustrated in the above example ?

**– Single Level Inheritance, Multilevel Inheritance, Multiple Inheritance**

(ii) Write the names of **all the members**, which are directly accessible by the member function **Give()** of class **Middle**.

(iii) Write the names of **all the members**, which are directly accessible by the member function **Out()** of class **Top**.

(iv) Write the names of **all the members**, which are directly accessible by the object **T** of class **Top** declared in the **main()** function.

**OR**

(d) Consider the following class HeadQuarter *4*

```
class HeadQuarter
{
   int Code;
   char Des[20];
protected :
   char Address[40];
public:
   void Get(){cin>>Code;gets(Des);gets(Address);}
   void Put(){cout<<Code<<Des<<Address<<endl;}
};
```

Write a code in C++ to protectedly derive another class FrontOffice from the base class HeadQuarter with following members.

Data Members

Location of type character of size 10

Budget of type double

Member Functions

A constructor function to assign Budget as 100000

Assign() to allow user to enter Location and Budget

Display() to display Location and Budget

**3.** (a) Write a user-defined function **NoTwoThree(int Arr[], int N)** in C++, which should display the value of all such elements and their corresponding locations in the array **Arr** (i.e. the array index), which are **not multiples of 2 or 3. N** represents the total number of elements in the array **Arr**, to be checked. *3*

Example : If the array Arr contains

| 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 25 | 8 | 12 | 49 | 9 |

Then the function should display the output as :

25 at location 0

49 at location 3

**OR**

(a) Write a user-defined function **ReArrange(int Arr[], int N)** in C++, which should swap the contents of the first half locations of the array **Arr** with the contents of the second half locations. **N** (which is an even integer) represents the total number of elements in the array **Arr**. *3*

Example :

If the array **Arr** contains the following elements (for **N = 6**)

| 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 12 | 5 | 7 | 23 | 8 | 10 |

Then the function should rearrange the array to become

| 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 23 | 8 | 10 | 12 | 5 | 7 |

NOTE :

- **DO NOT DISPLAY** the Changed Array contents.
- Do not use any other array to transfer the contents of array Arr.

(b) Write definition for a function **XOXO(char M[4][4])** in C++, which replaces every occurrence of an **X** with an **O** in the array, and vice versa. *2*

For example :

| ORIGINAL ARRAY M | | | |
|---|---|---|---|
| X | X | O | X |
| O | X | O | O |
| O | O | X | X |
| X | X | O | O |

| CHANGED ARRAY M | | | |
|---|---|---|---|
| O | O | X | O |
| X | O | X | X |
| X | X | O | O |
| O | O | X | X |

NOTE :

- **DO NOT DISPLAY** the Changed Array contents.
- Do not use any other array to transfer the contents of array M.

**OR**

(b) Write definition for a function **ColSwap(int A[4][4])** in C++, which swaps the contents of the first column with the contents of the third column. *2*

For example :

| ORIGINAL ARRAY A | | | |
|---|---|---|---|
| 10 | 15 | 20 | 25 |
| 30 | 35 | 40 | 45 |
| 50 | 55 | 60 | 65 |
| 70 | 75 | 80 | 85 |

| CHANGED ARRAY A | | | |
|---|---|---|---|
| 20 | 15 | 10 | 25 |
| 40 | 35 | 30 | 45 |
| 60 | 55 | 50 | 65 |
| 80 | 75 | 70 | 85 |

NOTE :

- **DO NOT DISPLAY** the Changed Array contents.
- Do not use any other array to transfer the contents of array A.

(c) Let us assume P[20][10] is a two-dimensional array, which is stored in the memory along the row with each of its elements occupying 2 bytes, find the address of the element P[10][5], if the address of the element P[5][2] is 25000. *3*

**OR**

(c) Let us assume P[20][30] is a two-dimensional array, which is stored in the memory along the column with each of its elements occupying 2 bytes. Find the address of the element P[5][6], if the base address of the array is 25000. *3*

(d) Write a user-defined function **Pop(Book B[], int &T),** which pops the details of a Book, from the static stack of Book B, at the location T (representing the Top end of the stack), where every Book of the stack is represented by the following structure : *4*

```
struct Book
{
   int   Bno;
   char  Bname[20];
};
```

**OR**

(d) For the following structure of Books in C++

```
struct Book
{
   int   Bno;
   char  Bname[20];
   Book  *Link;
};
```

Given that the following declaration of class BookStack in C++ represents a dynamic stack of Books :

```
class BookStack
{
   Book *Top; //Pointer with address of Topmost Book
                 of Stack
public:
   BookStack()
   {
      Top = NULL;
   }
   void Push(); //Function to push a Book into the
                  dynamic stack
   void Pop();  //Function to pop a Book from the
                  dynamic stack
   ~BookStack();
};
```

Write the definition for the member function void BookStack::Push(), that pushes the details of a Book into the dynamic stack of BookStack. *4*

(e) Evaluate the following Postfix expression, showing the stack contents : *2*

```
250,45,9,/,5,+,20,*,-
```

**OR**

(e) Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion : *2*

```
A + B * C ^ D - E
```

**4.** (a) A text file named **MESSAGE.TXT** contains some text. Another text file named **SMS.TXT** needs to be created such that it would store **only the first 150 characters** from the file **MESSAGE.TXT**.
Write a user-defined function **LongToShort()** in C++ that would perform the above task of creating **SMS.TXT** from the already existing file **MESSAGE.TXT**. *3*

**OR**

(a) A text file named **CONTENTS.TXT** contains some text. Write a user-defined function LongWords() in C++ which displays all such words of the file whose length is more than 9 alphabets. For example : if the file **CONTENTS.TXT** contains :

**"Conditional statements of C++ programming language are if and switch"** *3*

Then the function LongWords() should display the output as :

```
Conditional
statements
programming
```

(b) Write a user-defined function TotalPrice() in C++ to read each object of a binary file STOCK.DAT, and display the Name from all such records whose Price is above 150. Assume that the file STOCK.DAT is created with the help of objects of class Stock, which is defined below : *2*

```
class Stock
{
   char Name[20]; float Price;

public:
   char* RName() { return Name; }
   float RPrice() { return Price; }
};
```

**OR**

(b) A binary file DOCTORS.DAT contains records stored as objects of the following class :

```
class Doctor
{
   int DNo; char Name[20]; float Fees;
public:
   int *GetNo() { return DNo; }
   void Show()
   { cout<<Dno<<" * " <<Name<< " * " <<Fees<<endl;}
};
```

Write definition for function **Details(int N)** in C++, which displays the details of the Doctor from the file DOCTORS.DAT, whose DNo matches with the parameter N passed to the function. *2*

(c) Find the output of the following C++ code considering that the binary file STOCK.DAT exists on the hard disk with the following 5 records for the class STOCK containing Name and Price. *1*

| Name | Price |
|---|---|
| Rice | 110 |
| Wheat | 60 |
| Cheese | 200 |
| Pulses | 170 |
| Sauce | 150 |

```
void main()
{  fstream File
   File.open("STOCK.DAT",ios::binary|ios::in);
   Stock S;
   for (int I=1; I<=2; I++)
   {
      File.seekg((2*I-1)*sizeof(S));
      File.read((char*)&S, sizeof(S));
      cout << "Read : " << File.tellg()/sizeof(S)<< endl;
   }
   File.close();
}
```

**OR**

(c) Differentiate between seekg() and tellg(). *1*

## SECTION B

## [Only for candidates, who opted for Python]

**1.** (a) Write the names of any four data types available in Python. *2*

(b) Name the Python Library modules which need to be imported to invoke the following functions : *1*

(i) **sqrt()**

(ii) **start()**

(c) Rewrite the following code in python after removing all syntax error(s). Underline each correction done in the code. *2*

```
250 = Number
WHILE Number<=1000:
    if Number=>750:
        print Number
        Number=Number+100
    else
        print Number*2
        Number=Number+50
```

(d) Find and write the output of the following python code : *2*

```
Msg1="WeLcOME"
Msg2="GUeSTs"
Msg3=""
for I in range(0,len(Msg2)+1):
   if Msg1[I]>="A" and Msg1[I]<="M":
        Msg3=Msg3+Msg1[I]
   elif Msg1[I]>="N" and Msg1[I]<="Z":
       Msg3=Msg3+Msg2[I]
   else:
       Msg3=Msg3+"*"
print Msg3
```

(e) Find and write the output of the following python code : *3*

```
def Changer(P,Q=10):
   P=P/Q
   Q=P%Q
   print P,"#",Q
   return P
A=200
B=20
A=Changer(A,B)
print A,"$",B
B=Changer(B)
print A,"$",B
A=Changer(A)
print A,"$",B
```

(f) What possible output(s) are expected to be displayed on screen at the time of execution of the program from the following code ? Also specify the minimum values that can be assigned to each of the variables BEGIN and LAST. *2*

```
import random

VALUES=[10,20,30,40,50,60,70,80]
BEGIN=random.randint(1,3)
LAST=random.randint(BEGIN,4)

for I in range(BEGIN,LAST+1):
  print VALUES[I],"-",
```

| | |
|---|---|
| (i) 30 - 40 - 50 - | (ii) 10 - 20 - 30 - 40 - |
| (iii) 30 - 40 - 50 - 60 - | (iv) 30 - 40 - 50 - 60 - 70 - |

**2.** (a) Write four features of object oriented programming. *2*

(b)
```
class Box:                                  #Line 1
    L = 10                                  #Line 2
    Type="HARD"                             #Line 3
    def __init__(self,T,TL=30):             #Line 4
        self.Type = T                       #Line 5
        self.L    = TL                      #Line 6
    def Disp(self):                         #Line 7
        print self.Type,Box.Type            #Line 8
        print self.L,Box.L                  #Line 9
B1=Box("SOFT",20)                           #Line 10
B1.Disp()                                   #Line 11
Box.Type="FLEXI"                            #Line 12
B2=Box("HARD")                              #Line 13
B2.Disp()                                   #Line 14
```

Write the output of the above Python code. *2*

**OR**

(b)
```
class Target:                               #Line 1
    def __init__(self):                     #Line 2
        self.X = 20                         #Line 3
        self.Y = 24                         #Line 4
    def Disp(self):                         #Line 5
        print self.X,self.Y                 #Line 6
    def __del__(self):                      #Line 7
        print "Target Moved"                #Line 8
def One():                                  #Line 9
    T=Target()                              #Line 10
    T.Disp()                                #Line 11
One()                                       #Line 12
```

(i) What are the methods/functions mentioned in Line 2 and Line 7 specifically known as ?

(ii) Mention the line number of the statement, which will call and execute the method/function shown in Line 2. *2*

(c) Define a class HOUSE in Python with the following specifications : *4*

**Instance Attributes**

```
- Hno              # House Number
- Nor              # Number of Rooms
- Type             # Type of the House
```

**Methods/function**

```
- AssignType()     # To assign Type of House
                   # based on Number of Rooms as follows :
```

| Nor | Type |
|---|---|
| <=2 | LIG |
| ==3 | MIG |
| >3 | HIG |

```
- Enter()          # To allow user to enter value of
                   # Hno and Nor. Also, this method should
                   # call AssignType() to assign Type
- Display()        # To display Hno, Nor and Type
```

(d) Answer the questions (i) to (iii) based on the following :

```
class Furniture(object):                    #Line 1
    def __init__(self,Q):                   #Line 2
        self.Qty = Q
    def GetMore(self,TQ):                   #Line 3
        self.Qty =self.Qty+TQ
    def FRDisp(self):                       #Line 4
        print self.Qty

class Fixture(object):                      #Line 5
    def __init__(self,TQ):                  #Line 6
        self.Qty=TQ
    def GetMore(self,TQ):                   #Line 7
        self.Qty =self.Qty+TQ
    def FXDisp(self):                       #Line 8
        print self.Qty

class Flat(Furniture,Fixture):              #Line 9
    def __init__(self,fno):                 #Line 10
        self.Fno=fno
        Q=0
        if self.Fno<100:
          Q=10
        else:
          Q=20
        Furniture.__init__(self,Q):         #Line 11
        Fixture.__init__(self,Q):           #Line 12
    def More(self,Q):                       #Line 13
        Furniture.GetMore(self,Q)
        Fixture.GetMore(self,Q)
    def FLDisp(self):                       #Line 14
        print self.Fno,
        Furniture.FRDisp(self)
        Fixture.FXDisp(self)
    FL=Flat(101)                            #Line 15
    FL.More(2)
    FL.FLDisp()
```

(i) Write the type of the inheritance illustrated in the above. *1*

(ii) Find and write the output of the above code. *2*

(iii) What is the difference between the statements shown in Line 11 and Line 12 ? *1*

**OR**

(d) Define inheritance. Show brief python example of Single Level, Multiple and Multilevel Inheritance. *4*

**3.** (a) Consider the following randomly ordered numbers stored in a list :

106, 104, 106, 102, 105, 10

Show the content of list after the First, Second and Third pass of the selection sort method used for arranging in **ascending order**. *3*

*Note :* Show the status of all the elements after each pass very clearly encircling the changes.

**OR**

(a) Consider the following randomly ordered numbers stored in a list :

106, 104, 106, 102, 105, 107

Show the content of list after the First, Second and Third pass of the bubble sort method used for arranging in **descending order**. *3*

*Note :* Show the status of all the elements after each pass very clearly encircling the changes.

(b) Write definition of a method/function **AddOddEven(VALUES)** to display sum of odd and even values separately from the list of VALUES. *3*

For example :

If the VALUES contain [15, 26, 37, 10, 22, 13]

The function should display

```
Even Sum: 58
Odd Sum: 65
```

**OR**

(b) Write definition of a method/function **HowMany(ID,Val)** to count and display number of times the value of Val is present in the list ID. *3*

For example :

If the ID contains `[115,122,137,110,122,113]` and Val contains `122`

The function should display

```
122 found 2 Times
```

(c) Write **QueueUp(Client)** and **QueueDel(Client)** methods/functions in Python to add a new Client and delete a Client from a List of Clients names, considering them to act as insert and delete operations of the Queue data structure. *4*

**OR**

(c) Write **PushOn(Book)** and **Pop(Book)** methods/functions in Python to add a new Book and delete a Book from a List of Book titles, considering them to act as push and pop operations of the Stack data structure. *4*

(d) Write a python method/function **Swapper(Numbers)** to swap the first half of the content of a list Numbers with second half of the content of list Numbers and display the swapped values. *2*

*Note :* Assuming that the list has even number of values in it.

For example :

If the list Numbers contains

```
[35,67,89,23,12,45]
```

After swapping the list content should be displayed as

```
[23,12,45,35,67,89]
```

**OR**

(d) Write a python method/function **Count3and7(N)** to find and display the count of all those numbers which are between 1 and N, which are either divisible by 3 or by 7. *2*

For example :

If the value of N is 15

The sum should be displayed as

7

(as 3,6,7,9,12,14,15 in between 1 to 15 are either divisible by 3 or 7)

(e) Evaluate the following Postfix expression, showing the stack contents : *2*

```
250,45,9,/,5,+,20,*,-
```

**OR**

(e) Convert the following Infix expression to its equivalent Postfix expression, showing the stack contents for each step of conversion : *2*

```
A + B * C ^ D - E
```

**4.** (a) Write a statement in Python to open a text file WRITEUP.TXT so that new content can be written in it. *1*

**OR**

(a) Write a statement in Python to open a text file README.TXT so that existing content can be read from it. *1*

(b) Write a method/function **ISTOUPCOUNT()** in python to read contents from a text file WRITER.TXT, to count and display the occurrence of the word "IS" or "TO" or "UP". *2*

For example :

If the content of the file is

---

```
IT IS UP TO US TO TAKE CARE OF OUR SURROUNDING. IT
IS NOT POSSIBLE ONLY FOR THE GOVERNMENT TO TAKE
RESPONSIBILITY
```

---

The method/function should display

```
Count of IS TO and UP is 6
```

**OR**

(b) Write a method/function **AEDISP()** in python to read lines from a text file WRITER.TXT, and display those lines, which are starting either with A or starting with E. *2*

For example :

If the content of the file is

```
A CLEAN ENVIRONMENT IS NECESSARY FOR OUR GOOD HEALTH.
WE SHOULD TAKE CARE OF OUR ENVIRONMENT.
EDUCATIONAL INSTITUTIONS SHOULD TAKE THE LEAD.
```

The method should display

```
A CLEAN ENVIRONMENT IS NECESSARY FOR OUR GOOD HEALTH.
EDUCATIONAL INSTITUTIONS SHOULD TAKE THE LEAD.
```

(c) Considering the following definition of class STOCK, write a method/function **COSTLY()** in python to search and display Name and Price from a pickled file STOCK.DAT, where Price of the items are more than 1000. *3*

```
class Stock :
    def __init__(self,N,P):
        self.Name=N
        self.Price=P
    def Show(self):
        print self.Name,"@",self.Price
```

**OR**

(c) Considering the following definition of class DOCTORS, write a method/function **SPLDOCS()** in python to search and display all the content from a pickled file DOCS.DAT, where Specialisation of DOCTORS is "CARDIOLOGY". *3*

```
class DOCTORS :
    def __init__(self,N,S):
        self.Name=N
        self.Specialisation=S
    def Disp(self):
        print self.Name,"#",self.Specialisation
```

## SECTION C

## [For all candidates]

**5.** Write SQL queries for (i) to (iv) and write outputs for SQL queries (v) to (viii), which are based on the table given below : *8*

Table : TRAINS

| TNO | TNAME | START | END |
|---|---|---|---|
| 11096 | Ahimsa Express | Pune Junction | Ahmedabad Junction |
| 12015 | Ajmer Shatabdi | New Delhi | Ajmer Junction |
| 1651 | Pune Hbj Special | Pune Junction | Habibganj |
| 13005 | Amritsar Mail | Howrah Junction | Amritsar Junction |
| 12002 | Bhopal Shatabdi | New Delhi | Habibganj |
| 12417 | Prayag Raj Express | Allahabad Junction | New Delhi |
| 14673 | Shaheed Express | Jaynagar | Amritsar Junction |
| 12314 | Sealdah Rajdhani | New Delhi | Sealdah |
| 12498 | Shane Punjab | Amritsar Junction | New Delhi |
| 12451 | Shram Shakti Express | Kanpur Central | New Delhi |
| 12030 | Swarna Shatabdi | Amritsar Junction | New Delhi |

Table : PASSENGERS

| PNR | TNO | PNAME | GENDER | AGE | TRAVELDATE |
|---|---|---|---|---|---|
| P001 | 13005 | R N AGRAWAL | MALE | 45 | 2018-12-25 |
| P002 | 12015 | P TIWARY | MALE | 28 | 2018-11-10 |
| P003 | 12015 | S TIWARY | FEMALE | 22 | 2018-11-10 |
| P004 | 12030 | S K SAXENA | MALE | 42 | 2018-10-12 |
| P005 | 12030 | S SAXENA | FEMALE | 35 | 2018-10-12 |
| P006 | 12030 | P SAXENA | FEMALE | 12 | 2018-10-12 |
| P007 | 13005 | N S SINGH | MALE | 52 | 2018-05-09 |
| P008 | 12030 | J K SHARMA | MALE | 65 | 2018-05-09 |
| P009 | 12030 | R SHARMA | FEMALE | 58 | 2018-05-09 |

**NOTE : All Dates are given in 'YYY-MM-DD' format.**

(i) To display details of all Trains which Start from New Delhi.

(ii) To display the PNR, PNAME, GENDER and AGE of all Passengers whose AGE is below 50.

(iii) To display total number of MALE and FEMALE Passengers.

(iv) To display details of all Passengers travelling in Trains whose TNO is 12015.

(v) `SELECT MAX (TRAVELDATE), MIN(TRAVELDATE) FROM PASSENGERS WHERE GENDER = 'FEMALE';`

(vi) `SELECT END, COUNT(*) FROM TRAINS GROUP BY END HAVING COUNT(*)>1;`

(vii) `SELECT DISTINCT TRAVELDATE FROM PASSENGERS;`

(viii) `SELECT TNAME, PNAME FROM TRAINS T, PASSENGERS P WHERE T.TNO = P.TNO AND AGE BETWEEN 50 AND 60;`

**6.** (a) State any one Distributive Law of Boolean Algebra and verify it using truth table. *2*

(b) Draw the Logic Circuit of the following Boolean Expression : *2*

$A'.B' + A.C$

(c) Derive a Canonical POS expression for a Boolean function F, represented by the following truth table : *1*

| X | Y | Z | F(X,Y,Z) |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 0 |

(d) Reduce the following Boolean Expression to its simplest form using K-Map : *3*

$F(P,Q,R,S) = \Sigma(0,1,2,3,5,6,7,10,14,15)$

7. (a) Damodar Mohan has been informed that there had been a backdoor entry to his computer, which has provided access to his system through a malicious user/programs, allowing confidential and personal information to be subjected to theft. It happened because he clicked a link provided in one of the pop-ups from a website announcing him to be winner of prizes worth 1 Million Dollars. Which of the following has caused this out of the following ?

(i) Virus

(ii) Worm

(iii) Trojan Horse

Also, mention, what he should do to prevent this infection. *2*

(b) Tarini Wadhawa is in India and she is interested in communicating with her uncle in Australia. She wants to show one of her own designed gadgets to him and also wants to demonstrate its working without physically going to Australia. Which protocol out of the following will be ideal for the same ? *1*

(i) POP3

(ii) SMTP

(iii) VoIP

(iv) HTTP

(c) Give two differences between 3G and 4G telecommunication technologies. *1*

(d) Write the expanded names for the following abbreviated terms used in Networking and Communications : *2*

(i) MBPS

(ii) WAN

(iii) CDMA

(iv) WLL

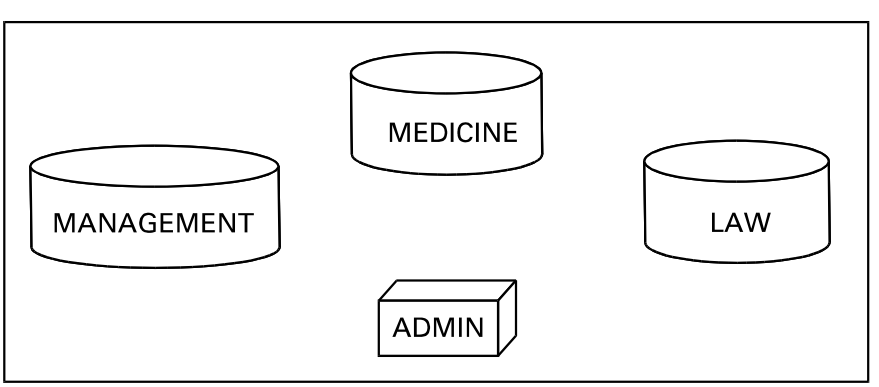
(e) Jonathan and Jonathan Training Institute is planning to set up its centre in Amritsar with four specialised blocks for Medicine, Management, Law courses alongwith an Admission block in separate buildings. The physical distances between these blocks and the number of computers to be installed in these blocks are given below. You as a network expert have to answer the queries as raised by their board of directors as given in (i) to (iv).

Shortest distances between various locations in metres :

| | |
|---|---|
| Admin Block to Management Block | 60 |
| Admin Block to Medicine Block | 40 |
| Admin Block to Law Block | 60 |
| Management Block to Medicine Block | 50 |
| Management Block to Law Block | 110 |
| Law Block to Medicine Block | 40 |

Number of Computers installed at various locations are as follows :

| | |
|---|---|
| Admin Block | 150 |
| Management Block | 70 |
| Medicine Block | 20 |
| Law Block | 50 |



(i) Suggest the most suitable location to install the main server of this institution to get efficient connectivity. *1*

(ii) Suggest the devices to be installed in each of these buildings for connecting computers installed within the building out of the following : *1*

- Modem
- Switch
- Gateway
- Router

(iii) Suggest by drawing the best cable layout for effective network connectivity of the blocks having server with all the other blocks. *1*

(iv) Suggest the most suitable wired medium for efficiently connecting each computer installed in every building out of the following network cables : *1*

- Co-axial Cable
- Ethernet Cable
- Single Pair Telephone Cable

तत् त्वं पूषन् अपावृणु

केन्द्रीय विद्यालय संगठन


**केन्द्रीय विद्यालय संगठन**

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