UNIT 1:PROGRAMMING IN C++
****KEY POINTS: Introduction to C++

- C++ is the successor of C language & developed by Bjarne Stroustrup at Bell Laboratories, New Jersey in 1979.

Tokens- smallest individual unit. Following are the tokens

- **Keyword**-Reserve word that can't be used as identifier
- **Identifies-**Names given to any variable, function, class, union etc.
- **Literals**-Value of specific data type
- **Variable**- memory block of certain size where value can be stored and changed.
- **Constant**- memory block where value can be stored once but can't changed later on
- **Operato**r – performs some action on data
  - Arithmetic(+,-,*,/,%), Relational/comparison (<,>,<=,>=,==,!=).
  - Logical(AND(&&),OR(||),NOT(!), Conditional (? :)
- **Precedence of operators:Hierarchy of operators**

Data types:Fundamental,Derived

Basic data type with Description

bool :Stores either value true or false,char :Typically a single octet(one byte). This is an integer type.
int :The most natural size of integer for the machine,Float: A single-precision floating point value.
Double: A double-precision floating point value,void :Represents the absence of data type/NULL value.

Derived data types: **Enumeration, Pointer, Array, Reference, Data structures,** and **Classes**.

(::) -Scope Resolution Operator,actual and formal parameters, global and local declaration of variable.call by value and call by reference method.
Function declaration and function definition difference.Type casting.

Conditional Operator (? :)

if...else statements can be written as one line statement using **? :** (ternary operator). It has the following general form:

```
Exp1 ? Exp2 : Exp3;
```
Where Exp1, Exp2, and Exp3 are expressions. Notice the use and placement of the colon.

*Useful Header file (Generally asked to identify in exam).

fstream.h graphics.h conio.h ctype.h iomanip.h iostream.h
math.h stdlib.h stdio.h stream.h string.h time.h

Some important libraries functions:

math.h   Function Meaning

sin(x) Sine of an angle x (measured in radians)
cos(x) Cosine of an angle x (measured in radians)
tan(x) Tangent of an angle x (measured in radians)
asin(x) Sin-1 (x) where x (measured in radians)
acos(x) Cos-1 (x) where x (measured in radians)
exp(x) Exponential function of x (ex)
log(x) logarithm of x
log 10(x) Logarithm of number x to the base 10
sqrt(x) Square root of x
pow(x, y) x raised to the power y
abs(x) Absolute value of integer number x
fabs(x) Absolute value of real number x

ctype.h Function Meaning(Character type)

isalpha(c) It returns True if C is an uppercase letter and False if c is lowercase.
isdigit(c) It returns True if c is a digit (0 through 9) otherwise False.
isalnum(c)
It returns True if c is a digit from 0 through 9 or an alphabetic character
(either uppercase or lowercase) otherwise False.
islower(c) It returns True if C is a lowercase letter otherwise False.
isupper(c) It returns True if C is an uppercase letter otherwise False.
toupper(c) It converts c to uppercase letter.
tolower(c) It converts c to lowercase letter.

string.h(String type)

strlen(S) It gives the no. of characters including spaces
present in a string S.
strcat(S1, S2)
It concatenates the string S2 onto the end of the
string S1. The string S1 must have enough
locations to hold S2.
strcpy(S1, S2)
It copies character string S2 to string S1. The S1
must have enough storage locations to hold S2.
strcmp((S1, S2)==0)
strcmp((S1, S2)>0)
strcmp((S1, S2) <0)
It compares S1 and S2 and finds out whether S1
equal to S2, S1 greater than S2 or S1 less than S2.
strrev(s) It converts a string s into its reverse
strupr(s) It converts a string s into upper case
strlwr(s) It converts a string s into lower case

stdlib.h(Standard Library)

randomize()
It initializes / seeds the random number generator with a random   number :- random(n) It generates a random number between o to n-1
atoi(s) It converts string s into a numerical representation.
itoa(n)   It converts a number to a string.

Classes & Objects: Concept Description

Class member functions:A member function of a class is a function that has its

definition or its prototype within the class definition like any
other variable.

Class access modifiers :A class member can be defined as public, private or
protected. By default members would be assumed as private.

Constructor & destructor:
A class constructor is a special function in a class that is
called when a new object of the class is created. A destructor
is also a special function which is called when created object
is deleted.

C++ copy constructor
The copy constructor is a constructor which creates an object
by initializing it with an object of the same class, which has
been created previously.

C++ friend functions A **friend** function is permitted full access to private and
protected members of a class.

C++ inline functions With an inline function, the compiler tries to expand the code
in the body of the function in place of a call to the function.

The this pointer in C++ Every object has a special pointer **this** which points to the
object itself.

Pointer to C++ classes
A pointer to a class is done exactly the same way a pointer to
a structure is. In fact a class is really just a structure with
functions in it.

Static members of a class Both data members and function members of a class can be
declared as static.

Important terms:
Polymorphism,function Overloading,Visibility Modes(Access specifiers:private,public,protected)

C++ Inheritance

One of the most important concepts in object-oriented programming is that of inheritance. Inheritance allows us to define a class in terms of another class, which makes it easier to create and maintain an application. This also provides
an opportunity to reuse the code functionality and fast implementation time.

When creating a class, instead of writing completely new data members and member functions, the programmer can designate that the new class should inherit the members of an existing class. This existing class is called the base class, and the new class is referred to as the derived class.

Access Control and Inheritance:
A derived class can access all the non-private members of its base class. Thus base-class members that should not be accessible to the member functions of derived classes should be declared private in the base class.

We can summarize the different access types according to who can access them in the following way:

Access public protected private
Same class yes yes yes
Derived classes yes yes no
Outside classes yes no no

A derived class inherits all base class methods with the following exceptions:

• Constructors, destructors and copy constructors of the base class.

• Overloaded operators of the base class.

• The friend functions of the base class.

Different Types of Inheritance
1. Single Inheritance,2. Hierarchical Inheritance
3. Multi Level Inheritance, 4. Hybrid Inheritance
5. Multiple Inheritance

Constructor and Destructor Order
The process of creating and deleting objects in C++ is not a trivial task. Every time an instance of a class is created the constructor method is called. The constructor has the same name as the class and it doesn't return any type, while the destructor's name it's defined in the same way, but with a '~' in front.

Copy constructor
The copy constructor is a constructor which creates an object by initializing it with an object of the same class, which has been created previously. The copy constructor is used to:

• Initialize one object from another of the same type.

• Copy an object to pass it as an argument to a function.

• Copy an object to return it from a function.

If a copy constructor is not defined in a class, the compiler itself defines one. If the class has pointer variables and has some dynamic memory allocations, then it is a must to have a copy constructor. The most common form of copy constructor is shown here:

```
classname (const classname &obj) {
// body of constructor
}
```

Here, obj is a reference to an object that is being used to initialize another object.

Data File Handling In C++ MM-06

File. The information / data stored under a specific name on a storage device, is called a file.

Stream. It refers to a sequence of bytes.

Text file. It is a file that stores information in ASCII characters. In text files, each line of text is terminated
with a special character known as EOL (End of Line) character or delimiter character. When this EOL
character is read or written, certain internal translations take place.

Binary file. It is a file that contains information in the same format as it is held in memory. In binary files, no delimiters are used for a line and no translations occur here.
Classes for file stream operation
ofstream: Stream class to write on files
ifstream: Stream class to read from files
fstream: Stream class to both read and write from/to files.
Opening a file
OPENING FILE USING CONSTRUCTOR
ofstream *fout*(*"results"*); //output only
ifstream *fin*(*"data"*); //input only
OPENING FILE USING open()

Stream-object.open(*"filename"*, mode)
ofstream *ofile*;
ofile.open(*"data1"*);
ifstream *ifile*;
ifile.open(*"data2"*);

File mode parameter Meaning

fstream *file*;
file.open (*"example.bin"*, ios::out | ios::app | ios::binary);

Closing File
fout.close();
fin.close();

INPUT AND OUTPUT OPERATION: **put() and get() function**
the function put() writes a single character to the associated stream. Similarly, the function get() reads a single
character form the associated stream.
example :
file.get(ch);
file.put(ch);

write() and read() function:write() and read() functions write and read blocks of binary data.
example: *file*.read((char *)&*obj*, sizeof(*obj*));
          file.write((char *)&*obj*, sizeof(*obj*));
eof():returns true (non zero) if end of file is encountered while reading;
otherwise return false(zero)

File Pointers And Their Manipulation

ios::beg start of the file
ios::cur current position of the pointer
ios::end end of the file

example:
file.seekg(-10, ios::cur);
# # #

Questions & Practice Sets: (1 Marks questions)
1) Name the header files that shall be needed for the following code:
void main( )
{
char String[ ] = "String";
cout << setw(2)<<String;
}
2) Which C++ header file(s) will be essentially required to be include to run/execute the following
C++ code: [CBSE-2010]
void main()
{
int Rno=24; char name[ ]="Alma Mater";
cout<<setw(10)<<Rno<<setw(20)<<name<<endl;
}
3) Name the header files that shall be needed for the following code:
void main( )
{
char word[]="Board Exam";
cout<<setw(20)<<word;
}
4) Name the header file(s) that shall be needed for successful compilation of the following C++
code.
void main( )
{
char String[20];
gets(String);
strcat(String,"CBSE");

puts(String);
}
5) Name the header file(s) that shall be needed for successful compilation of the following C++ code.
void main( )
{
char Text[40];
strcpy(Text,"AISSCE");
puts(Text); }
6) Name the header file to which the following below:
(i) abs( ) (ii) isupper( )
7) Name the header file to which the following belong:
(i) pow ( ) (ii)random( )
8) Name the header files to which the following belong:
(i) abs( ) (ii) strcmp( )
9) Name the header files to which the following belong: [AI 2005]
(i) puts( ) (ii) isalnum( )
10)Write the names of the header files to which the following belong:
(i) gets( ) (ii) strcmp( ) (iii)abs( ) (iv)isalnum( )
11) Name the header file, to which the following built-in function belongs:
(i) strcmp( ) (ii)getc( )
12) Name the header files of C++ to which the following functions belong:
(i)get( ) (ii)open( ) (iii)abs( ) (iv)strcat( )
20
13) Name the header file to be included for the use of the following built in functions: (i)getc( )
(ii)strcat()
14) Name the header file, to which following built in function belong:
(i) isupper( ) (ii)setw() (iii)exp( ) (iv)strcmp( )
15)Why main( ) function is so special. Give two reasons?
16) Name the header file of C++ to which following functions belong.
(i)strcat( ) (ii) scanf( ) (iii) getchar( ) (iv)clrscr( )
17) Name the header files, to which the following built in functions belongs to:
(i)cos( )(ii)setw( )(iii)toupper( )(iv)strcpy( )
18) Name the header files, to which the following built in functions belongs to:
(i)cos( )(ii)setw( )(iii)toupper( )(iv)strcpy( )
19) Name the header file to, which following built-in functions belong:
(i) strcpy() *(ii)* isdigit() *(iii)* log() *(iv)* puts()
20) **Name the header file to be included for the use of following built-in functions:**
(i) frexp() *(ii)* toupper() *[CBSE Sample Paper-2]*
21) Name the header flies of C++ to which the following functions belong:
(i) write() *(ii)* arc() *(iii)* open() *(iv)* strlen()
22) **Name the header files of C++ to which the following functions belong:** *[AI2002]*
(i) get() (ii) open() (iii) abs() (iv) strcat()
23) **Name the header files of C++ to which the following functions belong:** *[Comptt. 2002]*
(i) read() (ii) open() (iii) get() (iv) strcmp()
24) **Name the header fLle,to which the following built-in functions belong:**
(i) strcpy 0 (ii) gets()
25) **Name the header file, to which the following built-in functions belong:** *[AI2003]*
(i) strcmp() (ii) getc()
*26)***Write the names ofthe header flies to which the following belong:**
(i) sqrt() (ii) isalpha() (iii) puts() (iv) strcpy()
*27)***Write the names ofthe header flies to which the following belong:** *[AI 2004]*
(i) gets() (ii) strcmp() (iii) abs() (iv) isalnum()
*28)***Write the name of header flies to which the following belong:** *[Comptt 2004]*
(i) sqrt() (ii) strcpy() (iii) isalpha() (iv) open()

Answer to Questions
1 Marks Answer
1) Ans) iomanip.h
iostream.h
2) Ans) iostream.h
iomanip.h
3) Ans: iostream.h
iomanip.h
4) Ans) stdio.h string.h
5) Ans: string.h, stdio.h
6) Ans) (i) abs( ) - math.h, stdlib.h, complex.h
(ii)isupper( ) - ctype.h
7) **Ans***:*
(i) abs( ) - math.h, stdlib.h, complex.h
(ii) random( ) - stdlib.h
8) Ans) (i) abs( ) **-** stdlib.h, math.h, complex.h
strcmp( ) - string.h
9) Ans)
(i) puts( ) - stdio.h
(ii) isalnum( ) - ctype.h
10) Ans:
(i) gets( ) - stdio.h
(ii) strcmp( ) - string.h
(iii) abs( ) - math.h, stdlib.h,complex.h

(iv) isalnum( ) - ctype.h
11) Ans:
(i) strcmp( ) - string.h
(ii)getc( ) - stdio.h
12) Ans:
(i) get( ) - iostream.h
(ii) open( ) - fstream.h
(iii) abs( ) - math.h, stdlib.h
(iv) strcat( ) - string.h
13) Ans:
(i) getc( ) - stdio.h
(ii) strcat( ) - string.h
14) Ans)
(i) isupper( ) - ctype.h
(ii)setw( ) - iomanip.h
(iii)exp( ) - math.h
(iv)strcmp( ) - string.h
15) Ans) Execution of the program starts and ends at main( ). The main ( ) is the driver function of the
program. If it is not present in a program, no execution can take place.
16) Ans: (i)strcat( ) - string.h
(ii)scanf( ) - stdio.h
(iii)getchar( ) - stdio.h
(iv)clrscr( ) - conio.h
17) Ans:
(i) cos( ) - math.h
(ii) setw( ) - iomanip.h
(iii) toupper( ) - ctype.h
(iv) strcpy( ) - string.h
18) Ans:
(i) cos( ) - math.h
(ii) setw( ) - iomanip.h
(iii) toupper( ) - ctype.h
(iv) strcpy( ) - string.h
19) Ans.
(i) string.h *(ii)* ctype.h *(iii)* math.h *(iv)* stdio.h
20) Ans. (i) math.h *(ii)* ctype.h
21) Ans. (i) fstream.h *(ii)* graphics.h *(iii)* fstream.h *(iv)* string.h
22) Ans.
(i) iostream.h (ii) fstream.h (iii) math.h *(iv)* string.h
23) Ans.
(i) fstream.h (ii) fstream.h (iii) iostream.h *(iv)* string.h
24) Ans.
(i) string.h (ii) stdio.h>
25) Ans.
(i) string.h (ii) stdio.h
26) Ans.
(i) math.h (ii) ctype.h (iii) math.h (iv) string.h
27) Ans. (i) stdio.h (ii) string.h (iii) math.h (iv) ctype.h
28) Ans. (i) math.h (ii) strcpy.h (iii) ctype.h (iv) fstream.h

Inheritance questions:4 marks
Practice :- Consider the following declarations and answer the questions given below:
class vehicle
{ int wheels;
protected:
int passenger;
public:
void inputdata(int, int);
void outputdata();
};
class heavyvehicle: protected vehicle
{ int dieselpetrol;
protected:
int load;
public:
void readdata(int, int);
void writedata();
};
class bus:private heavyvehicle
{
char marks[20];
public:
void fetchdata(char);
void displaydata();
};
(i) Name the class and derived class of the class **heavyvehicle.**
(ii) Name the data members that can be accessed from function **displaydata()**
(iii) Name the data members that can be accessed by an object of **bus class**
(iv) Is the member function outputdata() accessible to the objects of **heavyvehicle class.**
Ans

(i) base class = vehicle, derived class = bus
(ii) The data members passenger, load, make are available to function display data
(iii) No data members can be accessed by the object of bus calss.
(iv) No member functions outputdata () is not accessible to the objects of heavy vehicle class.
Practice :- Consider the following declarations and answer the questions given below:
#include <iostream.h>
class book
{
char title[20];
char author[20];
int noof pages;
public:
void read();
void show();
};
class textbook: private textbook
{ int noofchapters, noof assignments;
protected:
int standard;
void readtextbook();
void showtextbook();
};
class physicsbook: public textbook
{
char topic[20];
public:

void readphysicsbook();
void showphysicsbook();
};
(i) Name the members, which can be accessed from the member functions of class physicsbook.
(ii) Name the members, which can be accessed by an object of Class textbook.
(iii) Name the members, which can be accessed by an object of Class physicsbook.
(iv) What will be the size of an object (in bytes) of class physicsbook.
Ans
(i) standard , readtextbook(),showtextbook() and topic;
(ii) readtextbook() and showtextbook()
(iii) readphysicsbook(), showphysicsbook(), readtextbook() and showtextbook()
(iv) The size of object of physicsbook= size of book + size of Textbook + size of physicsbook.
= 42+6+20 = 68 bytes

UNIT 2: DATA STRUCTURE (Using C++)
Primtitive,Non –Primitive two types mainly
A **data structure** is a particular way of storing and organizing data in a computer so that it can be used
efficiently.Different kinds of data structures are suited to different kinds of applications.
Types of data structure:- There are two types of data structures: **Linear data structure**-Array,Linked list,Stack,Queue,
Non-Linear data structue – Graph and Tree.
Declaring Arrays:
To declare an array in C++, the programmer specifies the type of the elements and the number of elements required by
an array as follows:
```
type arrayName [ arraySize ];
```
This is called a single-dimension array. The **arraySize** must be an integer constant greater than zero and **type** can be
any valid C++ data type. For example, to declare a 10-element array called balance of type double, use this statement:
```
double balance[10];
```
Initializing Arrays:
You can initialize C++ array elements either one by one or using a single statement as follows:
```
double balance[5] = {1000.0, 2.0, 3.4, 17.0, 50.0};
```
The number of values between braces { } can not be larger than the number of elements that we declare for the array
between square brackets [ ]. Following is an example to assign a single element of the array:
If you omit the size of the array, an array just big enough to hold the initialization is created. Therefore, if you write:
```
double balance[] = {1000.0, 2.0, 3.4, 17.0, 50.0};
```
Accessing Array Elements:
An element is accessed by indexing the array name. This is done by placing the index of the element within square
brackets after the name of the array. For example:
```
double salary = balance[9];
```
Searching in an Array
Linear search: Linear search or **sequential search** is a method for finding a particular value in a list, that
consists of checking every one of its elements, one at a time and in sequence, until the desired one is found.

Binary search
A **binary search** is an algorithm for locating the position of an element in a sorted array. It inspects the
middle element of the sorted list: if equal to the sought value, then the position has been found; otherwise,
the upper half or lower half is chosen for further searching based on whether the sought value is greater than
or less than the middle element. The method reduces the number of elements needed to be checked by a
factor of two each time, and finds the sought value if it exists in the list or if not determines "not present", in
logarithmic time. A binary search is a dichotomic divide and conquer search algorithm.

*Sorting an Array

A **sorting algorithm** is an algorithm that puts elements of a list in a certain order
1. **Insertion sort** is a simple sorting algorithm, a comparison sort in which the sorted array (or list) is built one entry at a time.

2. Selection Sort/Exchange Sort

Selection sort is a sorting algorithm, specifically an in-place comparison sort. It has O($n2$) complexity, making it inefficient on large lists, and generally performs worse than the similar insertion sort.

3. Bubble Sort:Bubble sort is a simple sorting algorithm. It works by repeatedly stepping through the list to be sorted,comparing each pair of adjacent items and swapping them if they are in the wrong order.

Stack

A stack is a container of objects that are inserted and removed according to the last-in first-out (LIFO) principle. In the pushdown stacks only two operations are allowed: **push** the item into the stack, and **pop** the item out of the stack. A stack is a limited access data structure - elements can be added and removed from the stack only at the top. **push** adds an item to the top of the stack, **pop** removes the item from the top. A helpful analogy is to think of a stack of books; you can remove only the top book, also you can add a new book on the top.

Evaluating a Postfix Expression. We describe how to parse and evaluate a postfix expression.

1. We read the tokens in one at a time.

2. If it is an integer, push it on the stack

3. If it is a binary operator, pop the top two elements from the stack, apply the operator, and push the result back on the stack.

Consider the following postfix expression

```
5 9 3 + 4 2 * * 7 + *
```

Here is a chain of operations

```
Stack Operations Output
------------------------------------
push(5); 5
push(9); 5 9
push(3); 5 9 3
push(pop() + pop()) 5 12
push(4); 5 12 4
push(2); 5 12 4 2
push(pop() * pop()) 5 12 8
push(pop() * pop()) 5 96
push(7) 5 96 7
push(pop() + pop()) 5 103
push(pop() * pop()) 515
```

Queues

A queue is a container of objects (a linear collection) that are inserted and removed according to the first-in first-out (FIFO) principle. An excellent example of a queue is a line of students in the food court of the UC. New additions to a line made to the back of the queue, while removal (or serving) happens in the front. In the queue only two operations are allowed **enqueue** and **dequeue**. Enqueue means to insert an item into the back of the queue, dequeue means removing the front item. The picture demonstrates the FIFO access. The difference between stacks and queues is in removing. In a stack we remove the item the most recently added; in a queue, we remove the item the least recently added.

UNIT 3,MM:08

DATABASES AND SQL(Structured Query Language)

DDL-Data definition /description language

DML:Data Manipulation language

DCL: Data Control Language

DATA BASE CONCEPT

• **Table:** A Table is used to store Data

• **View:** A view is the temporary table created using Original table.

• **Sequence:** Sequences are used to generate Primary key value.

• **Index:** They are used to improve queries.

• **Synonym:** They give alternative names to objects.

• **Primary Key:** The primary key of a relational table uniquely identifies each record in the table.Primary keys may consist of a single attribute or multiple attributes in combination.

• **Candidate Key:** A candidate key is a combination of attributes that can be uniquely used to identify a database record without any extraneous data. Each table may have one or more candidate keys.

• **Alternate Key:** An alternate key (or secondary key) is any candidate key which is not selected to be the primary key.

• **Foreign Key:** A foreign key is a field (or fields) that points to the primary key of another table. The purpose of the foreign key is to ensure referential integrity of the data. In other words, only values that are supposed to appear in the database are permitted.

• **Tuples:** The rows of tables (relations) are generally referred to as tuples.

• **Attribute:** The columns of tables are generally referred to as attribute.

• **Degree:** The number of attributes in a relation determines the degree of a relation.

• **Cardinality:** The number of rows in a relation is known as Cardinality.

• **Constraints:** Constraints are used to enforce rules at table level when ever row is inserted, updated/deleted from table.

• **Column Alias:** In many cases heading table may not be descriptive and hence it difficult to understand. In such case we use columns alias. It will change column heading with column alias.

• **DBA:** The DBA must be a manager, more than a technician-seeking to meet the needs of people who use the data. Since many user may share the same data resource, the DBA must be prepared to meet the need and objective.

• **DDL:** The DDL provides statements for the creation and deletion of tables and indexes.

• **DML:** The DML provides statements to enter, update, delete data and perform complex queries on these tables.

• **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.

Tables/Relations: In relational database Management systems (RDBMS) data are represented using tables (relations). A query issued against the DBMS (Data base management system)also results in a table. A table has the following structure:

Column 1 ,Column 2, . . ., Column n
* Tuple/Row
*Column /Attribute
*Domain Name :set of same values means a same Column values

A table can have up to 254 columns which may have different or same data types and sets of values(domains), respectively. Possible domains are alphanumeric data (strings), numbers and date formats.

Oracle offers the following basic data types:
- **char(n):** Fixed-length character data (string), n characters long. The maximum size for n is 255 bytes (2000 in Oracle8). Note that a string of type char is always padded on right with blanks to full length of n. (+ can be memory consuming).
Example: char(40)
- **varchar2(n):** Variable-length character string. The maximum size for n is 2000 (4000 in Oracle8). Only the bytes used for a string require storage. Example: varchar2(80)
- **number(o, d):** Numeric data type for integers and reals. o = overall number of digits, d = number of digits to the right of the decimal point. Maximum values: o =38, d= −84 to +127. Examples: number(8), number(5,2) Note that, e.g., number(5,2) cannot contain anything larger than 999.99 without resulting in an error. Data types derived from number are int[eger], dec[imal], smallintand real.
- **date:** Date data type for storing date and time.The default format for a date is: DD-MMM-YY. Examples: '13-OCT-94', '07-JAN-98'
- **long:** Character data up to a length of 2GB. Only one long column is allowed per table.Note: In Oracle-SQL there is no data type boolean. It can, however, be simulated by usingeither char(1) or number(1).As long as no constraint restricts the possible values of an attribute, it may have the specialvalue null (for unknown). This value is different from the number 0, and it is also different from the empty string ''.

Some Solved Problems:
Write a query on the customers table whose output will exclude all customers with a recharge <=100, unless they are resident of Jamnagar.
SELECT * FROM customers WHERE recharge >100 OR city ='Jamnagar' ;
Write a query that selects all students except those who have not paid the fees or NULLs in the fees field.
SELECT * FROM student WHERE fees < >0 OR (fees IS NOT NULL) ;
Write a query that lists customers in descending order of purchase amount. Output the purchase amount, followed by the customer's name and number.
SELECT pur_amt, c_name, c_num FROM customers ORDER BY pur_amt DESC ;
Write a command that puts the following values, in their given order, into the salesman table:
cust-name-Ambuja, city-Ahmedabad, comm - NULL, cust-num-1001.
INSERT INTO salesman (cust-name, city, comm, cust-num)
VALUES('Ambuja','Ahmedabad',NULL,1001) ;
What is the difference between Where and Having Clause ?
The HAVING clause places the condition on group but WHERE clause places the condition on individual rows.

Aggregate Functions
max Maximum value for a column
min Minimum value for a column
Example: List the minimum and maximum salary.
select min(SAL), max(SAL) from EMP;
Example: Compute the difference between the minimum and maximum salary.
select max(SAL) - min(SAL) from EMP;
sum Computes the sum of values (only applicable to the data type number)
Example: Sum of all salaries of employees working in the department 30.
select sum(SAL) from EMP where DEPTNO = 30;
avg Computes average value for a column (only applicable to the data type number)
Note: avg, min and max ignore tuples that have a null value for the specified attribute, but count considers null values.

Creating Tables
The SQL command for creating an empty table has the following form:
create table <table> (
<column 1> <data type> [not null] [unique] [<column constraint>],
. . . .
<column n> <data type> [not null] [unique] [<column constraint>],
[<table constraint(s)>]
);
Example: The create table statement for our EMP table has the form
create table EMP (
EMPNO number(4) not null,
ENAME varchar2(30) not null,
JOB varchar2(10),
MGR number(4),
HIREDATE date,
SAL number(7,2),
DEPTNO number(2));
Remark: Except for the columns EMPNO and ENAME null values are allowed.

Constraints/Conditions in Queries
Integrity rule1:-Entity integrity rule: Primary key cannot be Null.
Integrity rule 2:-Referential integrity rule: Foreign key cannot be Null.

Data Modifications in SQL
After a table has been created using the create table command, tuples can be inserted into the table, or tuples can be deleted or modified.
Insertions:
The most simple way to insert a tuple into a table is to use the insert statement
insert into <table> [(<column i, . . . , column j>)]
values (<value i, . . . , value j>);
Examples:
insert into PROJECT(PNO, PNAME, PERSONS, BUDGET, PSTART)
values(313, 'DBS', 4, 150000.42, '10-OCT-94');
or
insert into PROJECT
values(313, 'DBS', 7411, null, 150000.42, '10-OCT-94', null);
If there are already some data in other tables, these data can be used for insertions into a new table. For
this, we write a query whose result is a set of tuples to be inserted. Such an insert statement has the form insert into <table> [(<column i, . . . , column j>)]
<query>
Example: Suppose we have defined the following table:
create table OLDEMP (
ENO number(4) not null,
HDATE date);
We now can use the table EMP to insert tuples into this new relation:
insert into OLDEMP (ENO, HDATE).
select EMPNO, HIREDATE from EMP
where HIREDATE < '31-DEC-60';
Updates/Modify
For modifying attribute values of (some) tuples in a table, we use the update statement:
update <table> set <column i> = <expression i>, . . . , <column j> = <expression j>
[where <condition>];
Examples:
• The employee JONES is transferred to the department 20 as a manager and his salary is
increased by 1000:
update EMP set
JOB = 'MANAGER', DEPTNO = 20, SAL = SAL +1000
where ENAME = 'JONES';
• All employees working in the departments 10 and 30 get a 15% salary increase.
update EMP set
SAL = SAL* 1.15 where DEPTNO in (10,30);
In such a case we have a <query> instead of an <expression>.
Example: All salesmen working in the department 20 get the same salary as the manager
who has the lowest salary among all managers.
update EMP set
SAL = (select min(SAL) from EMP
where JOB = 'MANAGER')
where JOB = 'SALESMAN' and DEPTNO = 20;
Deletions
All or selected tuples can be deleted from a table using the delete command:
delete from <table> [where <condition>];
If the where clause is omitted, all tuples are deleted from the table. An alternative command for deleting all tuples from a table is the truncate table <table>
command. However, in this case, the deletions cannot be undone.
Joining Relations
• Comparisons in the where clause are used to combine rows from the tables listed in the from clause.
Example: In the table EMP only the numbers of the departments are stored, not their
name. For each salesman, we now want to retrieve the name as well as the
number and the name of the department where he is working:
select ENAME, E.DEPTNO, DNAME
from EMP E, DEPT D
where E.DEPTNO = D.DEPTNO
and JOB = 'SALESMAN';
Explanation: E and D are table aliases for EMP and DEPT, respectively. The computation of the query result
occurs in the following manner (without optimization):
1. Each row from the table EMP is combined with each row from the table DEPT (this operation is called
Cartesian product). If EMP contains m rows and DEPT contains n rows, we thus get n * m rows.
2. From these rows those that have the same department number are selected (where
E.DEPTNO = D.DEPTNO).
3. From this result finally all rows are selected for which the condition JOB = 'SALESMAN'
holds.
Grouping:aggregate functions can be used to compute a single valuefor a column. Often applications require grouping
rows that have certain properties and thenapplying an aggregate function on one column for each group
separately. For this, SQL provides
the clause group by <group column(s)>. This clause appears after the where clauseand must refer to
columns of tables listed in the from clause.
select <column(s)>
from <table(s)>
where <condition>
group by <group column(s)>
[having <group condition(s)>];
Those rows retrieved by the selected clause that have the same value(s) for <group column(s)>are grouped.
Aggregations specified in the select clause are then applied to each group separately.It is important that only
those columns that appear in the <group column(s)> clausecan be listed without an aggregate function in the
select clause !

Example: For each department, we want to retrieve the minimum and maximum salary.
select DEPTNO, min(SAL), max(SAL)
from EMP
group by DEPTNO;
Rows from the table EMP are grouped such that all rows in a group have the same department number. The aggregate functions are then applied to each such group. We thus get the following query result:
DEPTNO MIN(SAL) MAX(SAL)
10 1300 5000
20 800 3000
30 950 2850
Example: Retrieve the minimum and maximum salary of clerks for each department having more than three clerks.
Select DEPTNO, min(SAL), max(SAL)
from EMP
where JOB = 'CLERK'
group by DEPTNO
having count(*) > 3;
Note that it is even possible to specify a subquery in a having clause. In the above query, for example, instead of the constant 3, a subquery can be specified.
A query containing a group by clause is processed in the following way:
1. Select all rows that satisfy the condition specified in the where clause.
2. From these rows form groups according to the group by clause.
3. Discard all groups that do not satisfy the condition in the having clause.
4. Apply aggregate functions to each group.
5. Retrieve values for the columns and aggregations listed in the select clause.
Question : Drop table and Drop View difference?
UNIT 4: 8 marks , BOOLEAN LOGIC, Key points
Binary Decision :
• Every day we have to make logic decisions: "Should I use calculator or not?" Should I come or not?"
Each of these require YES or NO, so decision which results into either YES (TRUE) or NO (FALSE)
is called BINARY DECISION.
• Sentences, which can be determined to be true or false, are called logical statement and the result
TRUE or False are called Truth-values.
Truth table:
• Truth table is a table, which represents all the possible values of logical variables/statements along
with all the possible results of given combinations of values.
Logical Operators :
• Logical operators are derived from the Boolean algebra, which is the mathematical way of
representing the concepts without much bothering about what the concepts generally means.
(a) **NOT Operator**—Operates on single variable. It gives the complement value of variable.
(b) **OR Operator** -enotes Operations "logical Addition" and we use "+" symbol
 (c**) AND Operator** – AND Operator performs logical multiplications and symbol is (.) dot.
Evaluation of Boolean Expression Using Truth Table:
Logical variable are combined by means of logical operator (AND, OR, NOT) to form a Boolean
expression.
Basic Logic Gates
A gate is simply an electronic circuit, which operates on one or more signals to produce an output signal.
Gates are digital circuits because the input and output signals are either low (0) or high (1). Gates also called
logic circuits.
There are three types of logic gates:
1. Inverter (NOT gate) 2. OR gate 3. AND gate
Inverter (NOT gate): Is a gate with only one input signal and one output signal, the output state is always the
Opposite of the input state.
• **Truth table:**
Two Input OR gate..
X Y F
0 0 0
0 1 1
1 0 1
1 1 1
Basic postulates of Boolean Algebra:

a) Complement Rules
0 = 1 AND 1 = 0
Principal of Duality:
This states that starting with a Boolean relation another Boolean relation can be derived by. 1. Changing
each OR sign (+) to a AND sign (.)
2. Changing each AND sign (.) to a OR sign (+)
3. Replacing each 0 by 1 and each 1 by 0.
Example:
0+0=0 then dual is 1.1=1
1+0=1 then dual is 0.1=0
Basic theorem of Boolean algebra
Basic postulates of Boolean algebra are used to define basic theorems of Boolean algebra that provides all
the tools necessary for manipulating Boolean expression.
1. Properties of 0 and 1
(a) 0+X=X
(b) 1+X=1
(c) 0.X=0
(d) 1.X=X
2. Indempotence Law

(a) X+X=X
(b) X.X=X
3. Involution Law
(X) = X
4. Complementarity Law
(a) X+ X̄=1
(b) X. X̄=0
5. Commutative Law
(a) X+Y=Y+X
(b) X.Y=Y.X
6. Associative Law
(a) X+(Y+Z)=(X+Y)+Z
(b) X(YZ)=(XY)Z
7. Distributive Law
(a) X(Y+Z)=XY_XZ
(b) X=YZ=(X+Y)(X+Z)
8. Absorption Law
(a) X+XY= X
(b) X(X+Y)=X
Some other rules of Boolean algebra
X+X̄Y=X+Y

Demorgan's Theorem: Augustus DeMorgan had paved the way to Boolean algebra by discovering these two important theorems.

1. Demorgan's First Theorem
X̄ + Ȳ =X̄ .Ȳ
2. Demorgan's Second Theorem
X̄.Ȳ= X̄ + Ȳ

Minimization of Boolean expression:
A minimization Boolean expression means less numbers of gates, which means simplified circuitry.
There are two methods.
1. Algebraic Method :
This method makes use of Boolean postulates, rules and theorems to simplify the expression.
Example..1. Simplify AB`CD` + AB`CD +ABCD` +ABCD
Solution-- AB`CD` + AB`CD +ABCD` +ABCD
=AB`C(D`+D) +ABC(D`+D)
=AB`C.1 + ABC.1 (D`+D=1)
=AC(B`+B)
=AC.1 =AC

2. Using Karnaugh Map :K-MAP (SOP,POS)sum of product,product of sum
A Karnaugh map is graphical display of the fundamental products in a truth table.
For example:
• Put a 1 in the box for any minterm that appears in the SOP expansion.
• Basic idea is to cover the **largest adjacent** blocks you can whose side length is some power of 2.
• Blocks can "wrap around" the edges.• For example, the first K-map here represents
$xy + x\bar{y} = x(y + \bar{y}) = x$. (It 'neutralizes' the *y* variable)
• The second K-map, similarly, shows $xy + \bar{x}y = (x + \bar{x}) y = y$.
(It 'neutralizes' the *x* variable)
• Remember, group together adjacent cells of 1s, to form largest possible rectangles of sizes that are powers of 2.
• Notice that you can overlap the blocks if necessary.

Sum Of Products Reduction using K- Map
• In SOP reduction each square represent a minterm.
• Suppose the given function is f(A,B,C,D) = Σ (0,2,7,8,10,15)
• Enter the 1 in the corresponding position for each minterm of the given function.
• Now the K-map will be as follows:For reducing the expression first mark Octet, Quad, Pair then single.• Pair: Two adjacent 1's makes a pair.• Quad: Four adjacent 1's makes a quad.
• Octet: Eight adjacent 1's makes an Octet.• Pair removes one variable.
• Quad removes two variables.• Octet removes three variables.
Reduction of Expression : When moving vertically or horizontally in pair or a quad or an octet it can be observed that only one variable gets changed that can be eliminated directly in the expression.
The solution for above expression using K map is BCD + B'D'.

UNIT 5,MM:10
COMMUNICATION AND NETWORK CONCEPTS
Points to remember:
Network
☐ The collection of interconnected computers is called a computer network.
☐ Two computers are said to be interconnected if they are capable of sharing and exchanging information.
Needs of Network:
☐ Resource Sharing ☐ Reliability
☐ Cost Factor ☐ Communication Medium
Resource Sharing means to make all programs, data and peripherals available to anyone on the network irrespective of the physical location of the resources and the user.
Reliability means to keep the copy of a file on two or more different machines, so if one of them is unavailable (due to some hardware crash or any other) them its other copy can be used.
Cost factor means it greatly reduces the cost since the resources can be shared
Communication Medium means one can send messages and whatever the changes at one end are done can be immediately noticed at another.
Evolution Of Networking
1969 - First network came into existence
ARPANET (ADVANCED RESEARCH PROJECT AGENCY NETWORK)
MID 80'S - **NSFNET** (NATIONAL SCIENCE FOUNDATION NETWORK)

Diagrammatic presentation for slow learners
☐   **Internet** is the network of networks.
SWITCHING TECHNIQUES
Switching techniques are used for transmitting data across networks.
Different types are :
• Circuit Switching, • Message Switching, • Packet Switching
Circuit Switching
• *Circuit switching* is the transmission technology that has been used since the first communication
networks in the nineteenth century.
Message Switching
• In this the source computer sends data or the message to the switching circuit which stores the
data in its buffer. • Then using any free link to the switching circuit the data is send to the switching circuit.
ARPANET, NSFnet
INTERNET: Used to connect computers at U.S. defense and different universities.
a high capacity network to be used strictly for academic and engineering research.
the internetworking of ARPANET, NSFnet and other private networks.
• Entire message is sent to the destination. It reaches through different intermediate nodes
following the "store and forward" approach.
• No dedicated connection is required.
Packet Switching
• Conceived in the 1960's, *packet switching* is a more recent technology than circuit switching.
• Packet switching introduces the idea of cutting data i.e. at the source entire message is broken in
smaller pieces called packets which are transmitted over a network without any resource being
allocated.
DATA COMMUNICATION TERMINOLOGIES:
Data channel
• The information / data carry from one end to another
in the network by channel.
Baud & bits per second
(bps) • It's used to measurement for the information carry of
a communication channel**.** • Measurement Units :- • bit • 1 Byte= 8 bits • 1 KBPS (Kilo Byte Per Second)= 1024 Bytes , • 1 Kbps (kilobits Per Second) = 1024 bits,
• 1 Mbps (Mega bits Per Second)=1024 Kbps
Bandwidth: • It is amount of information transmitted or receives
per unit time. • It is measuring in Kbps/Mbps etc unit**.**
Transmission Media: • Data is transmitted over copper wires, fiber optic cable, radio and microwaves. the term 'media' is
used to generically refer to the physical connectors, wires or devices used to plug things together.
• **Basic communications media types:** • copper
○   unshielded twisted pair (utp) ○   shielded twisted pair (stp) ○   coaxial cable (thinnet, thicknet) • fiber optic ○   single-mode ○   multi-mode • infrared
• radio & microwave.
Twisted Pair Cable
• These cables consist of two insulated copper wires twisted around each other in a double helix.•
 Twisting of wires reduces crosstalk which is bleeding of a signal from one wire to another.
Types:
• Unshielded Twisted Pair (UTP) • Shielded Twisted Pair (STP :STP offers greater protection from interference and crosstalk due to shielding.
But it is heavier and costlier than UTP.
USE:
1. In local telephone communication
Advantages:
• Easy to install and maintain • Simple • Inexpensive • Low weight • Suitable for small (Local) Networks
Disadvantages:
• Not suitable for long distance due to high attenuation. • Low bandwidth support. • Low Speed
Coaxial cable
• Coaxial cable consists of a solid ,copper wire core surrounded by a plastic cladding shielded in a
wire mesh. • Shield prevents the noise by redirecting it to ground**.**

Types:
Coaxial cable comes in two sizes which are called *thinnet* and *thicknet.*
• Thicknet : segment length upto 500 m • Thinnet : segment length upto 185 m
USE:
In TV channel communication
Advantages:
• Better than twisted wire cable. • Popular for TV networks. • Offers higher bandwidth & Speed
• **Disadvantages:**
• Expensive than twisted wires.,• Not compatible with twisted wire cable.
Optical Fibres
• Thin strands of glass or glass like material designed to carry light from one source to another.• Source converts (Modulates) the data signal into light using
LED (Light Emitting Diodes) orLASER diodes and send it over the Optical fiber.
It consists of three parts:
1. The core: glass or plastic through which the light travels.2. The cladding : covers the core and reflects light back to the core
3. Protective coating : protects the fiber
Advantages
• Not affected by any kind of noise.• High transmission capacity• Speed of Light• Suitable for broadband communication
Disadvantages
• Installation requires care.• Connecting two Optical fibers is difficult.• Optical fibers are more difficult to solder• Most expensive
Microwaves
Microwaves are transmitted from the transmitters placed at very high towers to the receivers at a longdistance.
Microwaves are transmitted in line of sight fashion, and also propagated through thesurfaces.
Advantages

• Maintenance easy than cables. • Suitable when cable can not be used.

Disadvantages

• Repeaters are required for long distance communication. • Less Bandwidth available.

Satellite

Geostationary satellites are placed around 36000 KM away from the earth's surface. In satellite communication transmitting station transmits the signals to the satellite. (It is called up-linking). After receiving the signals (microwaves) it amplifies them and transmit back to earth in whole visibility area. Receiving stations at different places can receive these signals. (It is called down-linking).

Advantage

• Area coverage is too large

Disadvantage

• High investment

Network devices

Modem:

• A modem is a computer peripheral that allows you to connect and communicate with other

computers via telephone lines.• Modem means Modulation/ Demodulation.

• Modulation: A modem changes the digital data from your computer into analog data, a format

that can be carried by telephone lines.• Demodulation: The modem receiving the call then changes the analog signal back into digital

data that the computer can digest.• The shift of digital data into analog data and back again, allows two computers to speak with

one another.

External Modem,Internal Modem

RJ- 45 Connector

RJ-45 is short for Registered Jack-45. It is an eight wire connector which is commonly used to connect

computers on the local area networks i.e., LAN.

Network Interface Cards (Ethernet Card)

• A network card, network adapter or NIC (network interface card) is a piece of computer hardware

designed to allow computers to communicate over a **computer network**. It provides physical

access to a networking medium and often provides a low-level addressing system through the use

of MAC addresses. It allows users to connect to each other either by using cables or wirelessly.

Repeaters:A repeater is an electronic device that receives a signal and

retransmits it at a higher level or higher power, or onto the other

side of an obstruction, so that the signal can cover longer

distances without degradation. In most twisted pair Ethernet

configurations, repeaters are required for cable runs longer than

100 meters.

Hubs: A hub contains multiple ports. When a packet arrives at one port, it is

copied to all the ports of the hub. When the packets are copied, the

destination address in the frame does not change to a broadcast address.

It does this in a rudimentary way, it simply copies the data to all of the

Nodes connected to the hub.

Bridges A network bridge connects multiple network segments at

the data link layer (layer 2) of the OSI model. Bridges do not

promiscuously copy traffic to all ports, as hubs do, but learn which

MAC addresses are reachable through specific ports. Once the

bridge associates a port and an address, it will send traffic for that

address only to that port. Bridges do send broadcasts to all ports

except the one on which the broadcast was received.

• Bridges learn the association of ports and addresses by examining the source address of frames

that it sees on various ports. Once a frame arrives through a port, its source address is stored and the bridge assumes that MAC address is associated with that port. The first time that a previously

unknown destination address is seen, the bridge will forward the frame to all ports other than the

one on which the frame arrived.

• Bridges come in three basic types:

• Local bridges: Directly connect local area networks (LANs)

• Wireless bridges: Can be used to join LANs or connect remote stations to LANs.

Switches: Switch is a device that performs switching. Specifically, it forwards and filters OSI layer 2 datagrams (chunk of data communication) between ports (connected cables) based on the Mac-Addresses in the packets. This is distinct from a hub in that it only forwards the datagrams to the ports involved in the communications ratherthan all ports connected.

Routers:• Routers are networking devices that forward data packets between networks using headers and forwarding tables to determine the best path to forward the packets. Routers work at the network layer of the TCP/IP model or layer 3 of the OSI model. Routers also provide interconnectivity between like and unlike media (RFC 1812).

• A router is connected to at least two networks, commonly two LANs or WANs or a LAN and its ISP's network.

GATEWAY:A Gateway is a network device that connects dissimilar networks. It established an intelligent connection between a local area network and external networks with completely different structures.

Network topologies and types

Network topology:• Computer networks may be classified according to the

network topology upon which the network is based, such as Bus network, Star network, Ring

network, Mesh network, Star-bus network, Tree or Hierarchical topology network, etc.

Mesh Topology:• The value of fully meshed networks is proportional to the exponent of the number of subscribers,

assuming that communicating groups of any two endpoints, up to and including all the end points.

Star Topology: The type of network topology in which each of the nodes of the network is connected to a central node with a point-to-point link in a 'hub' and 'spoke' fashion, the central node being the 'hub' and the nodes that are attached to the central node being the 'spokes' (e.g., a collection of point-to-point links from the peripheral nodes that converge at a central node) – all data that is transmitted between nodes in the network is transmitted to this central node, which is usually some type of device that then retransmits the data to some or all of the other nodes in the network, although the central node may also be a simple common connection point (such as a 'punch-down' block) without any active device to repeat the signals.

Bus Topology,Ring Topology

Compter Networks

• A communications network is two or more computers connected to share data and resources are "networked." The simple idea behind computer networking is to allow users to access more information and give them access to devices not directly attached to their "local" system, such as printers or storage devices.

Types of networks:

Local Area Network (LAN)
Metropolitan Area Network (MAN)
Wide Area Network (WAN)
Network protpcols:
• A protocol means the rules that are applicable for a network.
Types of protocols are:
1. HTTP 2. FTP
3. TCP/IP 4. SLIP/PPP
• **Hypertext Transfer Protocol** (**HTTP**) is a communications protocol for the transfer of information on the intranet and the World Wide Web. Its original purpose was to provide a way to publish and retrieve hypertext pages over the Internet.
• HTTP is a request/response standard between a client and a server. A client is the end-user; the server is the web site.
• **FTP (File Transfer Protocol)** is the simplest and most secure way to exchange files over the Internet. The objectives of FTP are:
• To promote sharing of files (computer programs and/or data).
• To encourage indirect or implicit use of remote computers.
• To shield a user from variations in file storage systems among different hosts.
• To transfer data reliably, and efficiently.
• **TCP/IP (Transmission Control Protocol / Internet Protocol): TCP** - is responsible for verifying the correct delivery of data from client to server. Data can be lost in the intermediate network. TCP adds support to detect errors or lost data and to trigger retransmission until the data is correctly and completely received.
IP - is responsible for moving packet of data from node to node. IP forwards each packet based on a four byte destination address (the IP number).
The IP component provides routing from the department to the enterprise network, then to regional networks, and finally to the global Internet.
• **SLIP/PPP (Serial Line Internet Protocol / Point to Point Protocol)**
SLIP/PPP provides the ability to transport TCP/IP traffic ever serial line between two computers. The home user's computer has a communications link to the internet. The home user's computer has the networking software that can speak TCP/IP with other computers on the Internet
Telnet-It is an older internet utility that lets us log on to remote computer system. It also facilitates for terminal emulation purpose. Terminal emulation means using a pc like a mainframe computer through networking.
(i) Run telnet client- Type telnet in run dialog box.
(ii) Connect to telnet site -specify the host name, port and terminal type.
(iii) Start browsing- surf the shown site with provided instruction.
(iv) Finally disconnect-press Alt+F4.
Wireless/Mobile Computing: Wireless communication is simply data communication without the use of landlines. Mobile computing means that the computing device is not continuously connected to the base or central network.
1. **GSM(Global System for Mobile communication):** it is leading digital cellular system. In covered areas, cell phone users can buy one phone that will work any where the standard is supported. It uses narrowband TDMA, which allows eight simultaneous calls on the same radio frequency.
2. **CDMA(Code Division Multiple Access)**: it is a digital cellular technology that uses spreadspectrum
techniques. CDMA does not assign a specific frequency to each user. Instead ,every channel
uses the full available spectrum.
3. **WLL(Wireless in Local Loop) :** WLL is a system that connects subscribers to the public
switched telephone network using radio signals as a substitute for other connecting media.
4. **Email(Electronic Mail):** Email is sending and receiving messages by computer.
5. **Chat:** Online textual talk in real time , is called Chatting.
6. **Video Conferencing**: a two way videophone conversation among multiple participants is called video conferencing.
7. **SMS(Short Message Service):** SMS is the transmission of short text messages to and from a mobile pone, fax machine and or IP address.
8. **3G and EDGE:** 3G is a specification for the third generation of mobile communication of mobile communication technology. 3G promises increased bandwidth, up to 384 Kbps when a device is stationary.
EDGE(Enhanced Data rates for Global Evolution)
It is a radio based high speed mobile data standard.
NETWORK SECURITY CONCEPTS: Protection methods
1 Authorization - Authorization confirms the service requestor's credentials. It determines if the
service requestor is entitled to perform that operation.
2 Authentication - Each entity involved in using a web service the requestor, the provider and the
broker(if there is one) - is what it actually claims to be.
3 Encryption – conversion of the form of data from one form to another form.
4 Biometric System - involves unique aspect of a person's body such as Finger-prints, retinal
patterns etc to establish his/her Identity.
5 Firewall - A system designed to prevent unauthorized access to or from a private network is
called firewall. it can be implemented in both hardware and software or combination or both.
There are several types of firewall techniques-
* **Packet filter-** accepts or rejects of packets based on user defined rules.
* **Application gateway-** security mechanism to specific application like FTP and Telnet servers.
* **Circuit level gateway -** applies security mechanism when a connection is established.
* **Proxy Server -** Intercepts all messages entering and leaving the network.
Cookies - Cookies are messages that a web server transmits to a web browser so that the web server can keep track of the user's activity on a specific web site. Cookies have few parameters name, value, expiration date.
Hackers and crackers -Hackers are more interested in gaining knowledge about computer systems and possibly using this knowledge for playful pranks. Crackers are the malicious programmers who break into secure systems.
Cyber Law -It is a generic term, which refers to all the legal and regulatory aspects of internet and the World Wide Web.
WEB SERVERS::WWW (WORLD WIDE WEB)
It is a small part of Internet. It is a kind of Application of internet.It is a set of protocols that allows us to access any document on the Net through a naming system based on URLS. Internet was mainly used for obtaining textual information. But post-WWW the internet popularity grew tremendously because of graphic intensive nature of www.
Attributes of WWW:-
(i) **User friendly**- www resources can be easily used with the help of browser.
(ii) **Multimedia documents**-A web page may have graphic, audio, video, and animation etc at a time.
(iii) **Hypertext and hyperlinks**-the dynamic links which can move towards another web page is hyperlink.
(iv) **Interactive** -www with its pages support and enable interactivity between users and servers.
(v) **frame**-display of more than one section on single web page.
Web server- It is a WWW server that responds to the requests made by web browers.
e.g. : Apache, IIS, PWS(Personal web server for Windows 98).

Web browser- It is a WWW client that navigates through the World Wide Web and displays web pages. E.g.: FireFox Navigator, Internet Explorer etc.

Web sites- A location on a net server where different web pages are linked together by dynamic links is called a web site. Each web site has a unique address called URL.

Web page - A document that can be viewed in a web browser and residing on a web site is a web page.

Home page- a web page that is the starting page and acts as an indexed page is home page.

Web portal - that facilitates various type of the functionality as web site. for e.g. www.yahoo.com,www.rediff.com

Domain name- An internet address which is a character based is called a Domain name. Some most common domains are com, edu, gov, mil, net, org, and co.Some domain names are location based also. For e.g. au for Australia, a for Canada, in for India etc.

URL- A URL (uniform resource locator) that specifies the distinct address for each resource on the internet.e.g.http://encycle.msn.com/getinfo/stypes.asp

Web hosting - means hosting web server application on a computer system through which electronic content on the internet is readily available to any web browser client.

HTML -
It stands for Hyper Text Markup Language that facilitates to write web document that can be interpreted by any web browser. It provide certain tags that are interpreted by the browser how to display and act with the text, graphics etc. tags are specified in <>.
For e.g.
<body bgcolor=green> it is opening tag
</body> it is closing tag.
body is the tag with bgcolor attributes.

XML (eXtensible Markup Language)
XML is a markup language for documents containing structured information. Structured information contains both content (words, pictures etc.) and some indication of what role content plays.

DHTML- It stands for Dynamic Hyper Text Markup Language. DHTML refers to Web content that changes each time it is viewed. For example, the same URL could result in a different page depending on any number of parameters, such as:
*geographic location
*time of the day
*previous pages viewed by the user
*profile of the reader

WEB SCRIPTING – The process of creating and embedding scripts in a web page is known as webscripting.

SCRIPT: A Script is a list of commands embedded in a web page. Scripts are interpreted and executed by a certain program or scripting –engine.

Types of Scripts:
1. **Client Side Script:** Client side scripting enables interaction within a web page.
Some popular client-side scripting languages are VBScript, JavaScript, PHP(Hyper Text Preprocessor).
2. Server-Side Scripts: Server-side scripting enables the completion or carrying out a task at the serverend and then sending the result to the client –end.
Some popula server-side Scripting Languages are PHP, Perl, ASP(Active Server Pages), JSP(Java Server Pages) etc.

OPEN SOURCE TERMINOLOGIES
TERMINOLOGY & DEFINITIONS:
■ **Free Software:** The S/W's is freely accessible and can be freely used changed improved copied and distributed by all and payments are needed to make for free S/W.
■ **Open Source Software:** S/w whose source code is available to the customer and it can be modified and redistributed without any limitation .OSS may come free of cost but nominal charges has to pay nominal charges (Support of S/W and development of S/W).
■ **FLOSS (Free Libre and Open Source Software) :** S/w which is free as well as open source S/W. (Free S/W + Open Source S/W).
■ **GNU (G**NU's **N**ot **U**nix**) :** GNU project emphasize on the freedom and its objective is to create a system compatible to UNIX but not identical with it.
■ **FSF (Free Software Foundation) :** FSF is a non –profit organization created for the purpose of the free s/w movement. Organization funded many s/w developers to write free software.
■ **OSI (Open Source Initiative)** : Open source software organization dedicated to cause of promoting open source software it specified the criteria of OSS and its source code is not freely available.
■ **W3C(World Wide Web Consortium)** : W3C is responsible for producing the software standards for World Wide Web.
■ **Proprietary Software:** Proprietary Software is the s/w that 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 supplier.
■ **Freeware:** Freeware are the software freely available , which permit redistribution but not modification (and their source code is not available). Freeware is distributed in *Binary Form* (ready to run) without any licensing fees.
■ **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.
■ **Localization:** localization refers to the adaptation of language, content and design to reflect local cultural sensitivities .e.g. Software Localization: where messages that a program presents to the user need to be translated into various languages.
■ **Internationalization:** Opposite of localization.

OPEN SOURCE / FREE SOFTWARE:■ **Linux :** Linux is a famous computer operating system . popular Linux server set of program LAMP(Linux, Apache, MySQL, PHP)
■ **Mozilla :** Mozilla is a free internet software that includes:
• a web browser,• an email client,• an HTML editor,• IRC client
■ **Apache server:** Apache web server is an open source web server available for many platforms such as BSD, Linux, and Microsoft Windows etc.
• Apache Web server is maintained by open community of developers of Apache software foundation.
■ **MYSQL :** MYSQL is one of the most popular open source database system. Features of MYSQl :
• Multithreading,• Multi –User
• SQl Relational Database Server,• Works in many different platform
■ **PostgreSQL :** Postgres SQL is a free software object relational database server . PostgresSQL can be downloaded from www.postgressql.org.
■ **Pango :** Pango project is to provide an open source framework for the layout and rendering of internationalized text into GTK + GNOME environment.Pango using Unicode for all of its encoding ,and will eventually support output in all the worlds major languages.

■ **OpenOffice :** OpenOffice is an office applications suite. It is intended to compatible and directly complete with Microsoft office.
OOo Version 1.1 includes:
• Writer (word processor)
• Calc(spreadsheet)
• Draw(graphics program)
• etc
■ **Tomcat :** Tomcat functions as a servlet container. Tomcat implements the servlet and the
JavaServer Pages .Tomcat comes with the jasper compiler that complies JSPs into servlets.
■ **PHP(Hypertext Preprocessor) :** PHP is a widely used open source programming language for server side application and developing web content.
■ **Python:** Python is an interactive programming language originally as scripting language for
Amoeba OS capable of making system calls.

Important Board Questions MARKS
1. Explain function of hub and router. 1
Ans:
1. **Hub:** A hub contains multiple ports. When a packet arrives at one port, it is copied to all the ports of the hub. When the packets are copied, the destination address in the frame does not change to a broadcast address. It does this in a rudimentary way, it simply copies the data to all of the Nodes connected to the hub.
2. **Router :** routers are networking devices that forward data packets between networks using headers and forwarding tables to determine the best path to forward the packets

2. Expand the following terms 2
(i) URL (ii) ISP (iii) DHTML (iv) CDMA:
Ans; (i) URL: Unified Resource Locator
(ii) ISP: Internet Service Provider.
(iii) DHTML: Dynamic Hyper Text Markup Language

3. Differentiate between message switching and packet switching 1
Ans: Message Switching – In this form of switching no physical copper path is established in advance between sender and receiver. Instead when the sender has a block of data to be sent, it is stored in first switching office, then forwarded later. Packet Switching – With message switching there is no limit on block size, in contrast packet switching places a tight upper limit on block size.

4. Write two applications of Cyber Law. 2
Ans: Two applications of cyber law are Digital Transaction and Activities on Internet.

5. Explain GSM. 1
Ans: Global system for mobile, communications is a technology that uses narrowband TDMA, which allows eight simultaneous calls on the same radio frequency. TDMA is short for Time Division Multiple Access.
TDMA technology uses time division multiplexing and divides a radio frequency into time slots and then allocates these slots to multiple calls thereby supporting multiple, simultaneous data channels.

6. Write difference between coaxial and optical cable. 1
Ans: Coaxial cable consists of a solid wire core surrounded by one or more foil or wire shield , each separated by some kind of plastic insulator. Optical fibers consists of thin strands of glass or glass like material which are so constructed that they carry light from a source at one end of the fiber to a detector at the other end.

7. Write two advantage and disadvantage of **RING** topology. 2
Ans:
Advantages:
1. Short cable length.
2. No wiring closet space required.
Disadvantages:
1. Node failure causes network failure
2. difficult to diagnose faults

8. Define Open Source Software, Free Software, Freeware, and Shareware**. 2**
Ans:
Free Software : The S/W's is freely accessible and can be freely used changed improved copied and distributed by all and payments are needed to made for free S/W.
Open Source Software : S/w whose source code is available to the customer and it can be modified and redistributed without any limitation .OSS may come free of cost but nominal charges has to pay nominal charges (Support of S/W and development of S/W).
Freeware: Freeware are the software freely available , which permit redistribution but not modification (and their source code is not available). Freeware is distributed in *Binary Form* (ready to run) without any licensing fees.
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.

9. What is the difference between WAN and MAN? 2
Ans: MAN (Metropolitan Area Network) is the network spread over a city.
WAN (Wide Area Network) spread across countries.

10. What is the purpose of using FTP? 1
Ans: (i)To promote sharing of files (computer programs and/or data).
(ii)To encourage indirect or implicit use of remote computers

11. What is a Modem? 1
Ans: A modem is a computer peripheral that allows you to connect and communicate with other computers via telephone lines.

12. How is a Hacker different from a Cracker? 1
Ans: Hackers are more interested in gaining knowledge about computer systems and possibly using this knowledge for playful pranks.
Crackers are the malicious programmers who break into secure systems

13. Expand the following terms with respect to Networking: 2
(i) Modem (ii) WLL (iii) TCP/IP (iv) FTP
Ans: (i) Modem : Modulator/Demodulator
(ii) WLL: Wireless in Local Loop
(iii) TCP/IP: Transmission Control Protocol/Internet Protocol
(iv) FTP: File Transfer Protocol

14. What are Protocols? 1
Ans: A protocol means the rules that are applicable for a network.

It defines the standardized format for data packets, techniques for detecting and correcting errors and so on.

A protocol is a formal description of message formats and the rules that two or more machines must follow to exchange those messages.

E.g. using library books.

Types of protocols are:

1. HTTP
1. FTP
2. TCP/IP
3. SLIP/PPP

15. What is the difference between Repeater and a Bridge? 1

Ans: A Repeater is a network device that amplifies and restores signals for long distance transmission where as a Bridge is a network device that established an intelligent connection between two local networks with the same standard but with different types of cables.