

## ANSWERS FOR TEST-1

1. Reduce  $F(a, b, c, d) = \text{SIGMA } m(0,2,7,8,10,15)$  using Karnaugh map.

**Solution:** Given  $F(a, b, c, d) = \Sigma m(0,2,7,8,10,15)$

$$= m_0 + m_2 + m_7 + m_8 + m_{10} + m_{15}$$

$$m_0 = 0000 = \bar{A} \bar{B} \bar{C} \bar{D}$$

$$m_2 = 0010 = \bar{A} \bar{B} C \bar{D}$$

$$m_7 = 0111 = \bar{A} B C D$$

$$m_8 = 1000 = A \bar{B} \bar{C} \bar{D}$$

$$m_{10} = 1010 = A \bar{B} C \bar{D}$$

$$m_{15} = 1111 = A B C D$$

Truth table for the given function is as follows :

A	B	C	D	F
0	0	0	0	1
0	0	0	1	
0	0	1	0	1
0	0	1	1	
0	1	0	0	
0	1	0	1	
0	1	1	0	
0	1	1	1	1
1	0	0	0	1
1	0	0	1	
1	0	1	0	1
1	0	1	1	
1	1	0	0	
1	1	0	1	
1	1	1	0	
1	1	1	1	1

Mapping the given function in a K-map we get

CD \ AB	(00) $\bar{C}\bar{D}$	(01) $\bar{C}D$	(11)CD	(10) $C\bar{D}$
(00) $\bar{A}\bar{B}$	1	0	0	1
(01) $\bar{A}B$	0	0	1	0
(11)AB	0	0	1	0
(10) $A\bar{B}$	1	0	1	1

In the above K-map two groups have been marked, one Pair and One Quad.

Pair is  $m_7 + m_{15}$

And Quad is  $m_0 + m_2 + m_8 + m_{10}$

Reduced expression for pair ( $m_7 + m_{15}$ ) is  $BCD$  as  $A$  is removed. Reduced expression for quad ( $m_0 + m_2 + m_8 + m_{10}$ ) is  $\bar{B}\bar{D}$  as for horizontal corners  $C$  is removed and for vertical corners  $A$  is removed.

Thus final reduced expression is  $BCD + \bar{B}\bar{D}$

2. What are the operations performed on linear data structures?

Linear Data structures are kind of data structure that has homogeneous elements.

Some commonly used linear data structures are Stack, Queue and Linked Lists.

Operation on Stacks:

- `Stack()`: It creates a new stack that is empty. It needs no parameter and returns an empty stack.
- `push(item)`: It adds a new item to the top of the stack.
- `pop()`: It removes the top item from the stack.
- `peek()`: It returns the top item from the stack but does not remove it.
- `isEmpty()`: It tests whether the stack is empty.
- `size()`: It returns the number of items on the stack.

Operation on Queues:

- `Queue()`: It creates a new queue that is empty.
- `enqueue(item)`: It adds a new item to the rear of the queue.
- `dequeue()`: It removes the front item from the queue.
- `isEmpty()`: It tests to see whether the queue is empty.
- `size()`: It returns the number of items in the queue.

### 3. Write an algorithm to insert an element into the array.

*Insertion refers to inserting an element into the array.*

- Based on the requirement, new element can be added at the beginning, end or any given position of array.
- When an element is to be inserted into a particular position, all the elements from the asked position to the last element should be shifted into higher order position.

**ALGORITHM:** Insert (A, N, ITEM, Pos) A is an array with N elements. ITEM is the element to be inserted in the position Pos.

Step 1:       for I = N-1 down to Pos

                  A[ I + 1] = A[I]

                  [End of for loop]

Step 2:       A [Pos] = ITEM

Step 3:       N = N+1

Step 4:       Exit

### 4. Explain the advantages of OOP's.

- The programs are modularized based on the principle of classes and objects.
- Linking code & object allows related objects to share common code. This reduces code duplication and code reusability.
- Data is encapsulated along with functions. Therefore external non- member function cannot access or modify data, thus providing data security.
- Easier to develop complex software, because complexity can be minimized through inheritance.
- The concept of data abstraction separates object specification and object implementation.

- Creation and implementation of OOP code is easy and reduces software development time.
- OOP can communicate through message passing which makes interface description with outside system very simple.

**5. What are the types of inheritance? Explain any two.**

**Inheritance is the capability of one class to inherit properties from another class.**

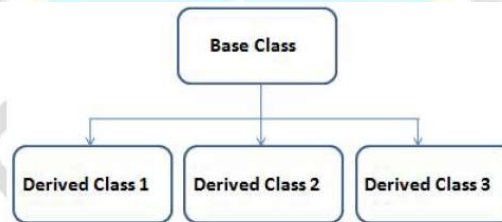
Based on the relationship, inheritance can be classified into five forms:

- Single Inheritance
- Multilevel Inheritance
- Multiple Inheritance
- Hierarchical Inheritance
- Hybrid Inheritance

➤ **Hierarchical Inheritance:**

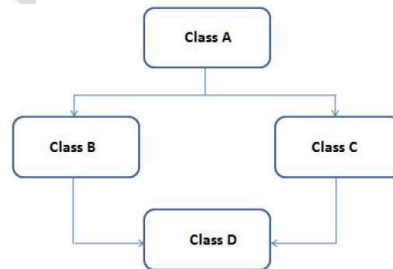
• *If a number of classes are derived from a single base class, it is called as hierarchical inheritance.*

• Hierarchical model exhibits top down approach by breaking up a complex class into simpler class.



➤ **Hybrid Inheritance:**

• *Hybrid Inheritance is combination of Hierarchical and multilevel inheritance.*



**6. Give the measures for preventing virus.**

- Never use a CD without scanning it for viruses.
- Always scan files downloaded from the internet.
- Never boot your PC from floppy.
- Write protect your disks and make regular backup..

- Use licensed software.
- Password protects your PC.
- Install and use antivirus software.
- Keep antivirus software up to date.
  - Some of the antivirus are: Kaspersky, Quick Heal, K7, Norton 360, AVG, Avasta, McAfee.

## 7. Explain the LOGICAL Operators with truth table.

### Logical Operators:

- There are three logical operator, NOT, OR and AND.
- These operators are now used in computer construction known as switching circuits.

#### ➤ NOT Operator:

- The Not operator is a unary operator. This operator operates on single variable.
- The operation performed by Not operator is called **complementation**.
- The symbol we use for it is bar.
- **X** means complementation of X
- If  $X=1$ ,  $X=0$  If  $X=0$ ,  $X=1$

#### OR Operator:

- The OR operator is a binary operator. This operator operates on two variables.
- The operation performed by OR operator is called **logical addition**.
- The symbol we use for it is '+'.
  - Example:  $X + Y$  can be read as **X OR Y**

#### AND Operator:

- The AND operator is a binary operator. This operator operates on two variables.
- The operation performed by AND operator is called **logical multiplication**.
- The symbol we use for it is '.'.
- Example:  $X . Y$  can be read as **X AND Y**

**8. What is communication (transmission) mode? Explain types of modes.**

**The way in which data is transmitted from one place to another is called data transmission mode.**

- It is also called the data communication mode.**
- It indicates the direction of flow of information.**
- Sometimes, data transmission modes are also called directional modes.**
- Different types of data transmission modes are as follows:**

**1. Simplex mode**

**2. Half-duplex mode**

**3. Full-duplex mode**

**Simplex Mode**

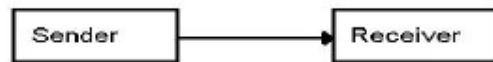
- In simplex mode, data can flow in only one direction.
- In this mode, a sender can only send data and cannot receive it.
- Similarly, a receiver can only receive data but cannot send it.
- Data sent from computer to printer is an example of simplex mode.
- In simplex mode, it is not possible to confirm successful transmission of data.
- It is also not possible to request the sender to re-transmit information.
- This mode is not widely used.

**Half-Duplex Mode**

- In half-duplex mode, data can flow in both directions but only in one direction at a time.
- In this mode, data is sent and received alternatively.
- It is like a one-lane bridge where two-way traffic must give way in order to cross the other.
- The Internet browsing is an example of half duplex mode.
- The user sends a request to a Web server for a web page.
- It means that information flows from user's computer to the web server.
- Web server receives the request and sends data of the requested page.
- The data flow the Web server to the user's computer.
- At a time a user can a request or receive the data of web page.

□ **Full-Duplex Mode**

- In full duplex-mode, data can flow in both directions at the same time.
- It is the fastest directional mode of data communication.
- The telephone communication system is an example of full-duplex communication mode.
- Two persons can talk at the same time.



*Figure: Simplex Mode*



*Figure: Half-Duplex Mode*



*Figure: Full-Duplex Mode*

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