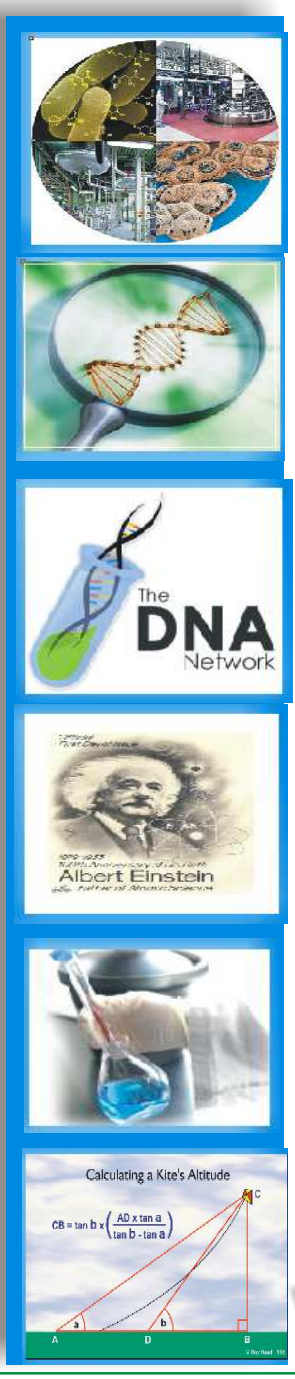

NIMCET-MCA

SAMPLE THEORY

- **SITTING ARRANGEMENT**
- **BOOLEAN ALGEBRA**

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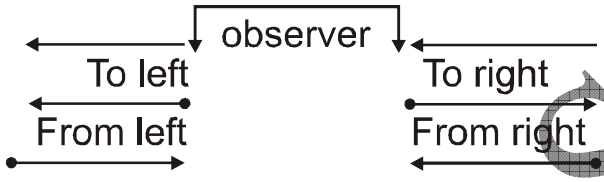
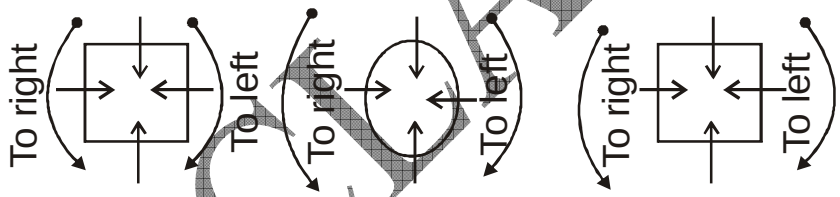
1. SITTING ARRANGEMENT

In Sitting arrangement problems, some clue about the sitting positions or placing sequences of some persons or items are given. We are required to form the sequence according to the data available and answer the questions on the basis of the sequences so formed.

In row :



In Geometrical Path : (Circular; Rectangular, Square and others)



EXAMPLE

DIRECTION(1,2):Choose the correct answer to the following questions.

Eight varsity baseball players (G, H, J, K, L, M, N, O) are to be honored at a special ceremony. Three of these players (H, M and O) are also varsity football players. Two of them (K and N) are also basketball players on the varsity team. In arranging the seats it was decided that no athlete in two sports should be seated next to another two-sport athlete.

1. Which of the following combinations is possible in order to have the arrangement of seat assignments as planned ?

(A) HGKJ

(B) HKJL

(C) JKMN

(D) JLHK

2. Which of the following cannot sit next to M ?

(A) G

(B) J

(C) G and J

(D) K

Sol: For (1-2) :

(i) Baseball and football players are H, M, O

(ii) Baseball and Basketball players are K, N

(iii) Only baseball players are G, J, I

1.(A) HGKJ is the possible arrangement.

2.(D) K cannot sit next to M

Neither can H, O, N

2. THEOREMS OF BOOLEAN ALGEBRA

S.No.	Theorem	Name
1.	(a) $A + B = B + A$ (b) $A.B = B.A$	Commutative law
2.	(a) $(A + B) + C = A + (B + C)$ (b) $(A . B) . C = A . (B . C)$	Associative law
3.	(a) $A.(B + C) = A . B + A . C$ (b) $A + (B . C) = (A + B) . (A + C)$	Distributive law
4.	(a) $A + A = A$ (b) $A . A = A$	Identity law
5.	$\overline{\overline{A}} = A$	Involution (Negation) law
6.	(a) $A + A . B = A$ (b) $A.(A + B) = A$	Absorption law
7.	(a) $0 + A = A$ (b) $1 . A = A$ (c) $1 + A = 1$ (d) $0 . A = 0$	Boolean postulates
8.	(a) $\overline{A} + A = 1$ (b) $\overline{A} . A = 0$	Inverse law
9.	(a) $A + \overline{A} . B = A + B$ (b) $A . (\overline{A} + B) = A . B$	
10.	(a) $\overline{A + B} = \overline{A} . \overline{B}$ (b) $\overline{A . B} = \overline{A} + \overline{B}$	DeMorgan's laws

Boolean Functions

A Boolean function is an expression formed with:

- Binary variables
- Binary operator (AND/OR)
- Unary Operator (NOT)
- Parentheses
- Equal Sign

For Example-

$F_1 = xyz'$

F_1 will assume one only and only if

$x = 1, y = 1$ and $z' = 1$

else

F_1 will always assume '0' for any other binary combination of values. A Boolean function can be represented in two forms:

• Expression like $F_1 = xyz'$

• Truth table

To represent a function in truth table, we need a list of 2^n combinations of 1's and 0's of n binary variables and a column showing the combination for which the function is '0' or '1'.

For example consider functions:

(a) $F_1 = xyz'$

(b) $F_2 = x + y'z$

(c) $F_3 = x'y'z + x'yz + xy'$

(d) $F_4 = xy' + x'z$

X	Y	Z	F1	F2	F3	F4
0	0	0	0	0	0	0
0	0	1	0	1	1	1
0	1	0	0	0	0	0
0	1	1	0	0	1	1
1	0	0	0	1	1	1
1	0	1	0	1	1	1
1	1	0	1	1	0	0
1	1	1	0	1	0	0

EXAMPLE

3. The Boolean expression $\bar{A}.B + A.\bar{B} + A.B$ is equivalent to

(A) A + B

(B) $\bar{A}.B$

(C) $\overline{A+B}$

(D) AB

3.(A) $\bar{A}B + A\left(B + \bar{B}\right)$

$\Rightarrow \quad A + \bar{A}B \qquad \left[x + \bar{x}y = x + y\right]$

$\Rightarrow \quad A + B$

4. The expression for EXOR is given by

(A) $\left(\overline{A+B}\right)AB$

(B) $AB + \bar{A}\bar{B}$

(C) $\left(A+B\right) + \left(\overline{AB}\right)$

(D) None of these

4.(D) $(A \oplus B) = A\bar{B} + \bar{A}B$.