

13. Boolean Algebra

Laws:

(1) Properties of 0 and 1:

$$\begin{aligned} 0 + X &= X, \\ 1 + X &= 1, \\ 0 \cdot X &= 0, \\ 1 \cdot X &= X \end{aligned}$$

(2) Idempotence Law:

$$\begin{aligned} \text{(a)} X + X &= X \\ \text{(b)} X \cdot X &= X \end{aligned}$$

(3) Involution Law: $\overline{\overline{A}} = A$

(4) Complementary Law:

$$\begin{aligned} \text{(a)} X + \overline{X} &= 1 \\ \text{(b)} X \cdot \overline{X} &= 0 \end{aligned}$$

(5) Commutative Law:

$$\begin{aligned} \text{(a)} X + Y &= Y + X \\ \text{(b)} X \cdot Y &= Y \cdot X \end{aligned}$$

(6) Associative Law:

$$\begin{aligned} \text{(a)} X + (Y + Z) &= (X + Y) + Z \\ \text{(b)} X \cdot (Y \cdot Z) &= (X \cdot Y) \cdot Z \end{aligned}$$

(7) Distributive Law:

$$\begin{aligned} \text{(a)} X(Y + Z) &= XY + XZ \\ \text{(b)} X + YZ &= (X + Y)(X + Z) \end{aligned}$$

(8) Absorption Law:

$$\begin{aligned} \text{(a)} X + XY &= X \\ \text{(b)} X(X + Y) &= X \end{aligned}$$

(9) Third distributive Law: $X + \overline{X}Y = X + Y$

(10) Demorgan's Theorems

$$\begin{aligned} \text{(a)} \overline{X + Y} &= \overline{X} \cdot \overline{Y} \\ \text{(b)} \overline{X \cdot Y} &= \overline{X} + \overline{Y} \end{aligned}$$

DELHI 2010:

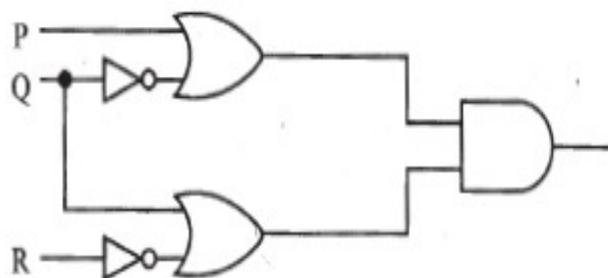
6. (a) Verify the following algebraically
 $(A' + B') \cdot (A + B) = A' \cdot B + A \cdot B'$

Ans. LHS

$$\begin{aligned} (A' + B') \cdot (A + B) &= A' \cdot A + A' \cdot B + A \cdot B' + B' \cdot B \\ &= 0 + A' \cdot B + A \cdot B' + 0 \end{aligned}$$

$$\begin{aligned} &= A' \cdot B + A \cdot B' \\ &= \text{RHS (Verified)} \end{aligned}$$

(b) Write the equivalent Boolean Expression for the following Logic circuit: **2**



Ans. $(P + Q') \cdot (Q' + R)$

(c) Write the POS form of a Boolean function H, which is represented in a truth table as follows:

X	Y	Z	H
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Ans.

$$(X + Y + Z') \cdot (X' + Y + Z') \cdot (X' + Y' + Z)$$

OR

$$H(X, Y, Z) = \Pi (1, 5, 6)$$

(d) Reduce the following Boolean Expression using K-Map : **3**

Ans.

$$F(U, V, W, Z) = \Sigma (3, 5, 7, 10, 11, 13, 15)$$

	U'V'	U'V	UV	UV'
W' Z'	0	4	12	8
W' Z	1	5	13	9
W Z	3	7	15	11
W Z'	2	6	14	10

OR

	W'Z'	W'Z	WZ	WZ'
U'V'	0	1	3	2
U'V	4	5	7	6
UV	12	13	15	14
UV'	8	9	11	10

$$F(U, V, W, Z) = WZ + VZ + UV'W$$

OUTSIDE DELHI 2010:

6 (a) Verify the following algebraically: 2

$$X'.Y + X.Y' = (X'+Y).(X+Y)$$

Ans. R. H . S

$$\begin{aligned} (X'+y).(x+y) &= x'.(x+y)+y'.(x+y) \\ &= x.x'+X'.y+y'.x+y'.y \\ &= x'.y+y'.X \\ &= x'.y+x.y' \end{aligned}$$

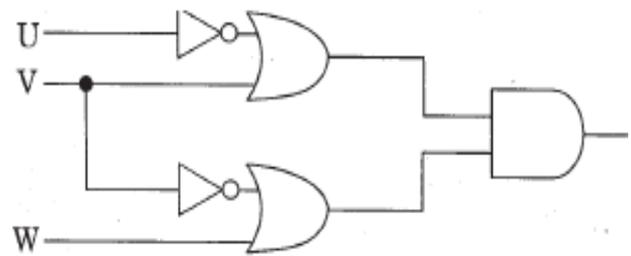
So L.H.S=R.H.S

OR

L.H.S.

$$\begin{aligned} X'.Y + X.Y' &= (X'.Y+X) (X'.Y+Y') \\ &= (X'+X).(Y+X).(X'+Y').(Y+Y') \\ &= 1.(X+Y).(X' +Y').1 \\ &= (X+Y).(X'+Y') \\ &= R.H.S. \end{aligned}$$

(b) Write the equivalent Boolean Expression for the following Logic Circuit: 2



Ans. $(U'+V) . (V'+W)$

(c) Write the SOP form of a Boolean function G, which is represented in a truth table as follows: 1

P	Q	R	G
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

Ans)

$$G(P,Q,R)=P'.Q.R'+P'.Q.R+P.Q'.R'+P.Q.R'+P.Q.R$$

OR

$$G(P,Q,R) = \Sigma (2,3,4,6,7)$$

(d) Reduce the following Boolean Expression using K-Map : 3

$$F(A,B,C,D) = \Sigma (3,4,5,6, 7,13,15)$$

	A'B'	A'B	AB	AB'
C' D'	0	4	12	8
C' D	1	5	13	9
C D	3	7	13	11
C D	2	6	14	10

OR

	C'D'	C'D	CD	CD'
A'B'	0	1	3	2
A'B	4	5	7	6
A B	12	13	15	14
A B'	8	9	11	10

Ans)

$$F(A,B,C,D) = A'B + BD + A'CD$$

DELHI 2009:

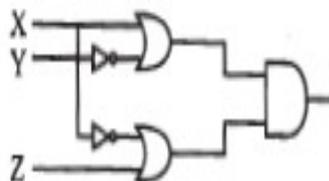
6. (a) Verify $X'Y + X.Y' + X'Y' = (X' + Y')$ using truth table. 2

Ans)

X	Y	X'	Y'	X'Y	XY'	X'Y'	X'Y+XY'+X'Y'	X'+Y'
0	0	1	1	0	0	1	1	1
0	1	1	0	1	0	0	1	1
1	0	0	1	0	1	0	1	1
1	1	0	0	0	0	0	0	0

↑ ↑
VERIFIED

(b) Write the equivalent Boolean Expression for the following Logic Circuit: 2



Ans $(X+Y') \cdot (X' +Z)$

(c) Write the POS form of a Boolean function H, which is represented in a truth table as follows: 1

A	B	C	H
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

Ans)

$$(A+B+C).(A'+B+C).(A'+B'+C)$$

OR

$$H(A,B,C) = \sum (0, 5, 6)$$

(d) Reduce the following Boolean Expression using K-Map : 3

$$F(P, Q, R, S) = \sum(1, 2, 3, 5, 6, 7, 9, 11, 12, 13, 15)$$

Ans

	P'Q'	P'Q	PQ	PQ'
R'S'				
R'S	0	4	1	12
RS	1	1	5	1
RS'	1	1	1	1
	1	1		14
				10

$$F(P,Q,R,S) = PQR'+R+ P'R$$

OUTSIDE DELHI 2009:

6. (a) State and verify absorption law using truth table. 2

Ans Absorption Law : For every $X, Y \in B$

i) $X + X \cdot Y = X$

$X \cdot (X + Y) = X$ (by Duality)

ii) $X + X' \cdot Y = X + Y$

(i)

X	Y	XY	X+XY
0	0	0	0
0	1	0	0
1	0	0	1
1	1	1	1

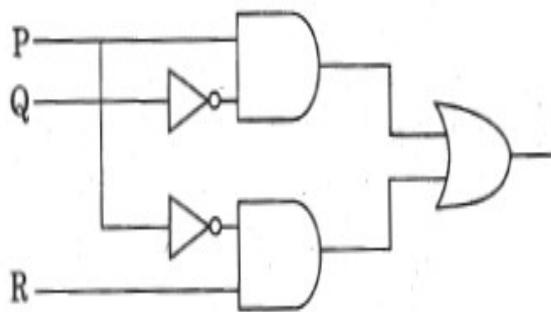
↑ ↑
VERIFIED

(ii)

X	X'	Y	X'Y	X+X'Y	X+Y
0	1	0	0	0	0
0	1	1	1	1	1
1	0	0	0	1	1
1	0	1	0	1	1

↑ ↑
VERIFIED

(b) Write the equivalent Boolean Expression for the following Logic Circuit: 2



Ans $P.Q' + P'.R$

(c) Write the POS form of a Boolean function G, which is represented in a truth table as follows: 1

U	V	W	G
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	1

$$(U+V'+W) \cdot (U+V'+W') \cdot (U'+V'+W)$$

OR

$$G(U,V,W) = \Pi (2, 3, 6)$$

(d) Reduce the following Boolean Expression using K-Map :
 $H(U,V,W,Z) = \Sigma(0, 1, 4, 5, 6, 7, 11, 12, 13, 14, 15)$

Ans

	U'V'	U'V	UV	UV'
W'Z'	1 0	1 4	1 12	8
W'Z	1 1	1 5	1 13	9
WZ	3	1 7	1 15	1 11
WZ'	2	1 6	1 14	10

$$H(U,V,W,Z) = V + U'W' + UWZ$$

2008 Outside Delhi:

6. (a) State and Verify Absorption law in Boolean Algebra. 2

Ans)

$$X+X.Y=X$$

X	Y	X.Y	X+X.Y	X
0	0	0	0	0
0	1	0	0	0
1	0	0	1	1
1	1	1	1	1

OR

$$X.(X+Y)=X$$

X	Y	X+Y	X.(X+Y)	X
0	0	0	0	0
0	1	1	0	0
1	0	1	1	1
1	1	1	1	1

OR

$$X+X'.Y=X+Y$$

X	Y	X'	X'.Y	X+X'.Y	X+Y
0	0	1	0	0	0
0	1	1	1	0	0
1	0	0	0	1	1
1	1	0	0	1	1

OR

$$X.(X'+Y)=X.Y$$

X	Y	X'	X'+Y	X.(X'+Y)	X.Y
0	0	1	1	0	0
0	1	1	1	0	0
1	0	0	0	0	0
1	1	0	1	1	1

OR

$$X+X.Y=X$$

$$\text{L.H.S} = X+X.Y$$

$$=X.1+X.Y$$

$$=X.(1+Y)$$

$$=X.1$$

$$=X$$

$$=\text{R.H.S}$$

Verified

OR

$$X(X+Y)=X$$

$$\text{L.H.S} = X.(X+Y)$$

$$\text{L.H.S} = X.X+X.Y$$

$$=X+X.Y$$

$$=X.1+X.Y$$

$$=X.(1+Y)$$

$$=X.1$$

$$=X$$

$$=\text{R.H.S}$$

Verified

OR

$$X+X'.Y=X+Y$$

$$\text{L.H.S} = (X+X').(X+Y)$$

$$=1.(X+Y)$$

$$=X+Y$$

$$=\text{R.H.S}$$

Verified

OR

$$X.(X'+Y)=X.Y$$

$$\text{L.H.S} = X.(X'+Y)$$

$$=X.X'+X.Y$$

$$=0+X.Y$$

$$=X.Y$$

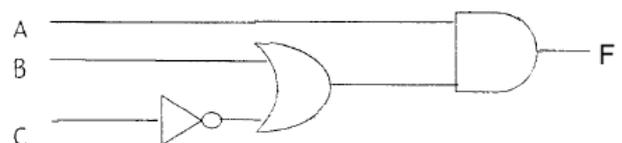
$$=\text{R.H.S}$$

Verified

(b) Draw a logical circuit diagram for the following Boolean Expression: 1

$$A.(B+C')$$

Ans)



(c) Convert the following Boolean expression into its equivalent Canonical Product of sum form (POS): $A.B'C + A'.B.C + A'.B.C'$ 2

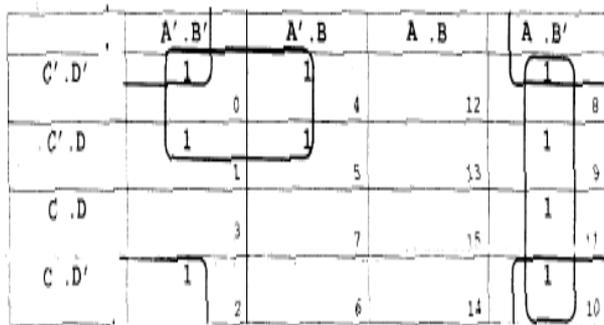
Ans)

$$= \Pi(0, 1, 4, 6, 7)$$

OR

$$= (A+B+C).(A+B+C').(A'+B+C).(A'+B'+C).(A'+B'+C')$$

(d) Reduce the following Boolean expression using K-map: 3
 $F(A,B,C,D) = \sum(0,1,2,4,5,8,9,10,11)$



$$F(A,B,C,D) = A'.C' + A.B' + B'.D'$$

2008 Delhi:

6. (a) State and verify De Morgan's law in Boolean Algebra. 2

Ans)

$$(X+Y)' = X'.Y'$$

OR

$$(X.Y)' = X'+Y'$$

Verification:

X	Y	X+Y	(X+Y)'	X'	Y'	X'.Y'
0	0	0	1	1	1	1
0	1	1	0	1	0	0
1	0	1	0	0	1	0
1	1	1	0	0	0	0

↑ VERIFIED ↑

OR

$$(X+Y)' = X'.Y'$$

If $(X+Y)'.(X+Y) = (X'.Y').(X+Y)$

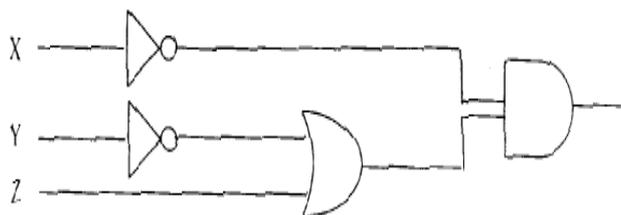
If 0 = $X'.Y'.X + X'.Y'.Y$

If 0 = $0 + 0$

Hence Proved and Verified

(b) Draw a Logical Circuit Diagram for the following Boolean Expression. 1

$$X'.(Y'+Z)$$



(c) Convert the following Boolean expression into its equivalent Canonical Sum of Product Form (SOP):

$$(X'+Y+Z).(X'+Y+Z).(X'+Y'+Z).(X'+Y'+Z)$$

Ans)

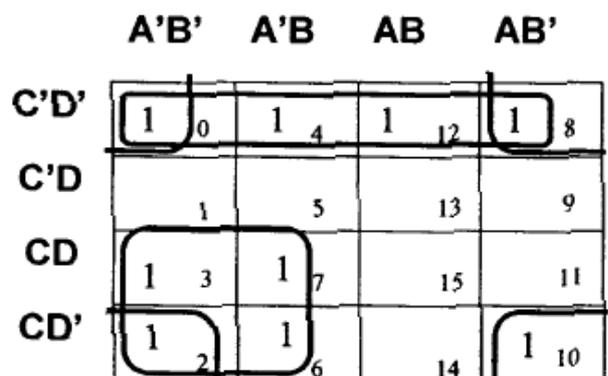
$$F(X, Y, Z) = \Pi(4, 5, 6, 7)$$

$$= \Sigma(0, 1, 2, 3)$$

$$= X'.Y'.Z' + X'.Y'.Z + X'.Y.Z' + X'.Y.Z$$

(d) Reduce the following Boolean Expression using K-map. 3
 $F(A,B,C,D) = \sum(0,2,3,4,6,7,8,10,12)$

Ans)



$$F = C'.D' + A'.C + B'.D'$$

2007 Outside Delhi:

6. (a) State De Morgan's Theorems and verify the same using truth table. 2

Ans)

(a) If $X, Y \in B$

$$(X+Y)' = X' \cdot Y'$$

$$(X \cdot Y)' = X' + Y'$$

X	Y	X'	Y'	X+Y	(X+Y)'	X' \cdot Y'
0	0	1	1	0	1	1
0	1	1	0	1	0	0
1	0	0	1	1	0	0
1	1	0	0	1	0	0

X	Y	X'	Y'	X \cdot Y	(X \cdot Y)'	X' + Y'
0	0	1	1	0	1	1
0	1	1	0	0	1	1
1	0	0	1	0	1	1
1	1	0	0	1	0	0

(b) Write the equivalent canonical product of sum expression for the following sum of product expression: 2

$$F(X, Y, Z) = \sum (0, 2, 4, 5)$$

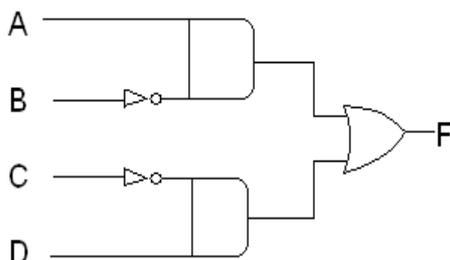
Ans)

$$F(X, Y, Z) = \prod (1, 3, 6, 7)$$

OR

$$F = (X+Y+Z')(X+Y'+Z)(X'+Y'+Z)(X'+Y'+Z')$$

(c) Write the equivalent Boolean expression for the following logic circuit 2



Ans)

$$F = A \cdot B' + C' \cdot D$$

(d) Reduce the following Boolean expression using K-Map : 2

$$F(A, B, C, D) = \prod (5, 6, 7, 8, 9, 12, 13, 14, 15)$$

Ans)

	A' \cdot B'	A' \cdot B	A \cdot B	A \cdot B'
C' \cdot D'	1 0	1 4	12	8
C' \cdot D	1 1	5	13	9
C \cdot D	1 3	7	15	11
C \cdot D'	1 2	6	14	10

$$F(A, B, C, D) = A' \cdot B' + B' \cdot C' + A' \cdot C' \cdot D'$$

OR

	A + B	A + B'	A' + B'	A' + B
C + D	0	4	0 12	0 8
C + D'	1	0 5	0 13	0 9
C' + D'	3	0 7	0 15	1 11
C' + D	2	0 6	0 14	1 10

$$F(A, B, C, D) = (A' + C) \cdot (B' + D') \cdot (B' + C')$$

2007 Delhi:

6 (a) State Distributive law and verify the same using truth table. 2

Ans)

(a) If X, Y, Z are Boolean Variables then

$$X \cdot (Y + Z) = X \cdot Y + X \cdot Z$$

OR

$$X + Y \cdot Z = (X + Y) \cdot (X + Z)$$

X	Y	Z	Y+Z	X.(Y+Z)	XY	XZ	X.Y+X.Z
0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0
0	1	0	1	0	0	0	0
0	1	1	1	0	0	0	0
1	0	0	0	0	0	0	0
1	0	1	1	1	0	1	1
1	1	0	1	1	1	0	1
1	1	1	1	1	1	1	1

VERIFIED

(b) Write the equivalent canonical product of sum expression for the following sum of product expression: 2

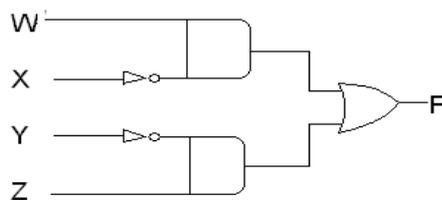
$$F(X, Y, Z) = \Pi (1, 3, 6, 7)$$

Ans)

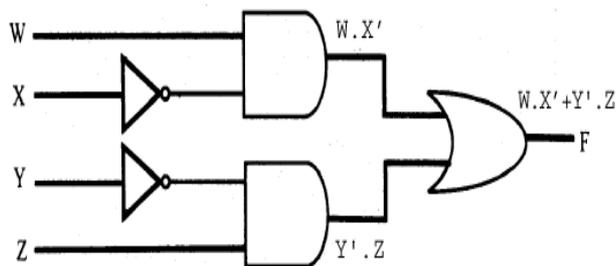
$$F(X, Y, Z) = \pi(0, 2, 4, 5)$$

$$= X' \cdot Y' \cdot Z' + X' \cdot Y \cdot Z' + X \cdot Y' \cdot Z' + X \cdot Y' \cdot Z$$

(c) Write the equivalent Boolean expression for the following logic circuit 2



Ans)



$$F = W \cdot X' + Y' \cdot Z$$

d) Reduce the following Boolean expression using K - Map : 2

$$F(U, V, W, Z) = \Sigma(0, 1, 2, 3, 4, 10, 11)$$

	U'V'	U'V	UV	UV'
W'Z'	1	1		
W'Z	1			
WZ	1			1
WZ'	1			1

$$F = U' \cdot V' + W \cdot V' + U' \cdot W' \cdot Z'$$

2006 Outside Delhi:

6.(a) State and verify Associative Law. 2

Ans)

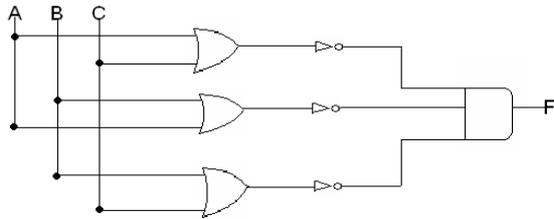
(i) $X + (Y + Z) = (X + Y) + Z$

X	Y	Z	Y+Z	X+Y	X+(Y+Z)	(X+Y)+Z
0	0	0	0	0	0	0
0	0	1	1	0	1	1
0	1	0	1	1	1	1
0	1	1	1	1	1	1
1	0	0	0	1	1	1
1	0	1	1	1	1	1
1	1	0	1	1	1	1
1	1	1	1	1	1	1

(ii) $X \cdot (Y \cdot Z) = (X \cdot Y) \cdot Z$

X	Y	Z	YZ	X.Y	X.(Y.Z)	(X.Y).Z
0	0	0	0	0	0	0
0	0	1	0	0	0	0
0	1	0	0	0	0	0
0	1	1	1	0	0	0
1	0	0	0	0	0	0
1	0	1	0	0	0	0
1	1	0	0	1	0	0
1	1	1	1	1	1	1

(b) Write the equivalent expression for the following Logic Circuit : 2



Ans)

$$(A+C)' \cdot (A+B)' \cdot (B+C)'$$

(c) Express $P + Q'R$ in POS form. 1

$$(P+Q')(P+R)$$

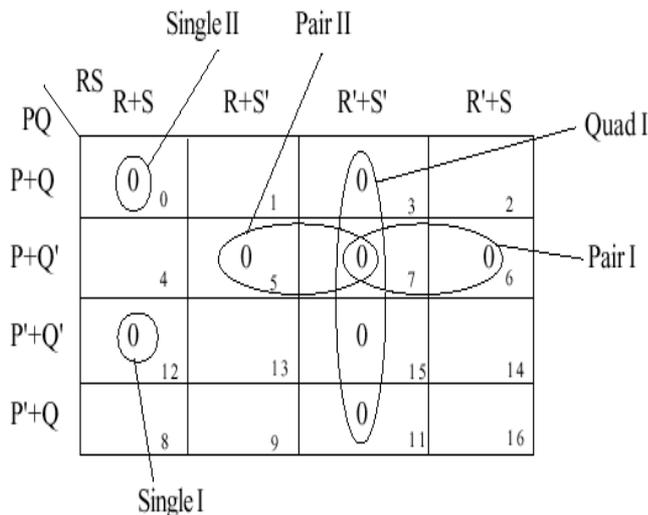
OR

$$(P+Q'+R) \cdot (P+Q'+R')$$

(d) Reduce the following Boolean expression using K – Map : 3

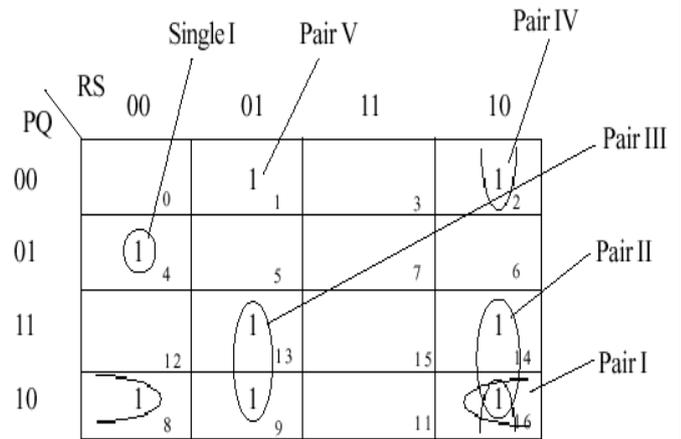
F(P, Q, R, S) =

$$\Pi (0,3,5,6,7,11,12,15)$$



$$F(P,Q,R,S) = (P+Q+R+S) \cdot (P'+Q'+R+S) \cdot (P+Q'+R') \cdot (P+Q'+S') \cdot (R'+S')$$

OR



$$F(P,Q,R,S) = P'QR'S' + PQ'S' + PRS' + PR'S + Q'RS' + Q'R'S$$

2006 Delhi:

6.(a) State and verify Distributive Law. 2

Ans)

$$(a) A(B + C) = AB + AC$$

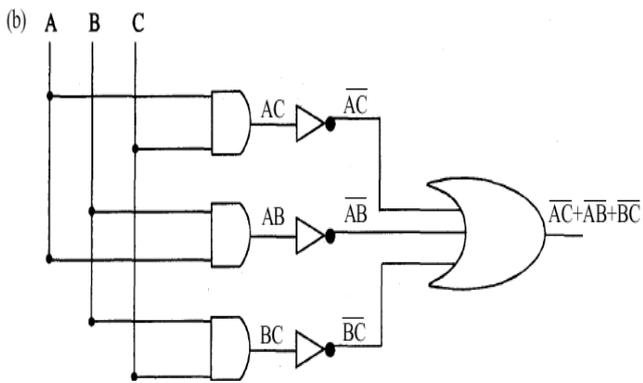
$$(b) A + (BC) = (A + B)(A + C)$$

Verification of first distributive law using truth table:

A	B	C	B+C	A(B+C)	AB	AC	AB+AC
0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0
0	1	0	1	0	0	0	0
0	1	1	1	0	0	0	0
1	0	0	0	0	0	0	0
1	0	1	1	1	0	1	1
1	1	0	1	1	1	0	1
1	1	1	1	1	1	1	1

Comparing Column Numbers 5 and 8, Distributive law is verified.

(b) Write the equivalent expression for the following Logic Circuit : 2



(c) Express $P + Q'R$ in canonical SOP form. 1

$$\begin{aligned}
 & (P + Q'R) \\
 &= P(Q + Q')(R + R') + Q'R(P + P') \\
 &= (PQ + PQ')(R + R') + PQ'R + P'Q'R \\
 &= PQR + PQ'R + PQR' + PQ'R' + P'Q'R \\
 &\quad + P'Q'R \\
 &= PQR + PQ'R + PQR' + PQ'R' + P'Q'R
 \end{aligned}$$

(d) Reduce the following Boolean expression using K-Map: 3

$$F(P, Q, R, S) = \sum(0, 3, 5, 6, 7, 11, 12, 15)$$

	P'O'	P'O	PO	PO'
R'S'	1		1	
R'S		1		
RS	1	1	1	1
RS'		1		

OR

	R'S'	R'S	RS	RS'
P'O'	1		1	
P'O		1	1	1
PO	1		1	
PO'			1	

$$F = RS + P'QS + P'QR + P'Q'R'S' + PQR'S'$$

2005 Outside Delhi

6. (a) State and verify Absorption Law in Boolean algebra. 2

Ans)

Absorption Law:

$$X + X.Y = X$$

OR

$$X.(X+Y) = X$$

OR

$$X + X'.Y = X + Y$$

OR

$$X.(X'+Y) = X.Y$$

X	Y	X.Y	X+X.Y
0	0	0	0
0	1	0	0
1	0	0	1
1	1	1	1

OR

X	Y	X+Y	X.(X+Y)
0	0	0	0
0	1	1	0
1	0	1	1
1	1	1	1

OR

X	Y	X'	X'+Y	X.(X'+Y)	X.Y
0	0	1	0	0	0
0	1	1	1	0	0
1	0	0	0	0	0
1	1	0	1	1	1

OR

X	Y	X'	X'.Y	X+X'.Y	X+Y
0	0	1	0	0	0
0	1	1	1	1	1
1	0	0	0	1	1
1	1	0	0	1	1

OR

Algebraic Verification:

$$\begin{aligned} X+X.Y &= X \\ X.1+X.Y &= X \\ X.(1+Y) &= X \\ X.1 &= X \\ X &= X \end{aligned}$$

OR

$$\begin{aligned} X.(X+Y) &= X \\ XX+X.Y &= X \\ X.1+X.Y &= X \\ X.(1+Y) &= X \\ X.1 &= X \\ X &= X \end{aligned}$$

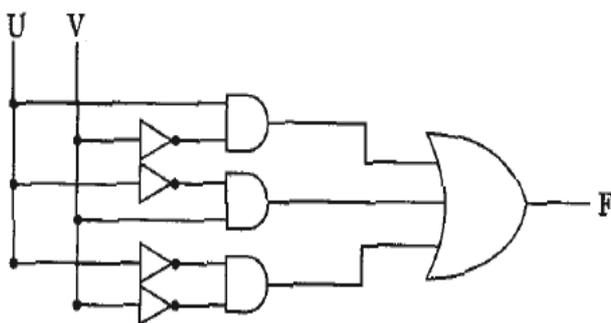
OR

$$\begin{aligned} X+X'.Y &= X+Y \\ (X+X')(X+Y) &= X+Y \\ 1.(X+Y) &= X+Y \\ X+Y &= X+Y \end{aligned}$$

OR

$$\begin{aligned} X(X'+Y) &= X.Y \\ XX'+X.Y &= X.Y \\ 0+X.Y &= X.Y \\ X.Y &= X.Y \end{aligned}$$

(b) Write the equivalent expression for the following Logic Circuit : 2



Ans)

$$U.V'+U'.V+U'.V$$

(c) Write the POS form of a Boolean Function F, Which is represented by the following truth table: 1

X	Y	Z	F
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	0

Ans)

$$(X+Y'+Z)(X'+Y+Z).(X'+Y'+Z)(X'+Y'+Z')$$

(d) Reduce the following Boolean expression using K - Map : 3

$$F(A, B, C, D) = \sum(0,1,2,3,4,5,10,11,15)$$

	A'B'	A'B	AB	A.B'
C'D'	1 0	1 4		12 8
C'D	1 1	1 5		13 9
C.D	1 3	7	1 15	1 11
C.D'	1 2	6		1 10

	C'D'	C'D	C.D	C.D'
A'B'	1 0	1 1	1 3	1 2
A'B	1 4	1 5	7	6
A.B		12 13	1 15	14
A.B'	8	9	1 11	1 10

$$F(A,B,C,D)=A'C'+B'.C+A.C.D$$

2005 Delhi:

6.(a) State and verify Associative law in Boolean Algebra. 2

Ans)

Associative Laws of Boolean Algebra:

$$A.(B.C) = (A.B).C$$

OR

$$A+(B+C) = (A+B)+C$$

Verification of $A.(B.C) = (A.B).C$

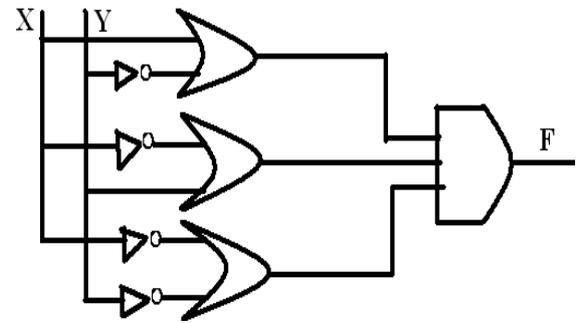
A	B	C	B.C	A.(B.C)	A.B	(A.B).C
0	0	0	0	0	0	0
0	0	1	0	0	0	0
0	1	0	0	0	0	0
0	1	1	1	0	0	0
1	0	0	0	0	0	0
1	0	1	0	0	0	0
1	1	0	0	0	1	0
1	1	1	1	1	1	1

OR

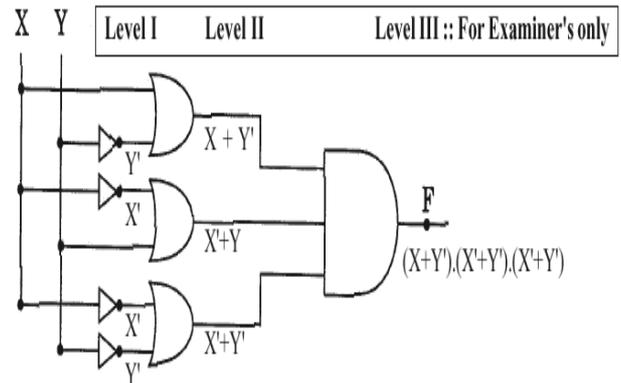
Verification of $A+(B+C) = (A+B)+C$

A	B	C	B+C	A+(B+C)	A+B	(A+B)+C
0	0	0	0	0	0	0
0	0	1	1	1	0	1
0	1	0	1	1	1	1
0	1	1	1	1	1	1
1	0	0	0	1	1	1
1	0	1	1	1	1	1
1	1	0	1	1	1	1
1	1	1	1	1	1	1

(b) Write the equivalent Boolean expression for the following Logic Circuit: 2



Ans)



(c) Write the SOP form of a Boolean Function F, Which is represented by the following truth table: 1

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

Ans)

$$A'.B'.C' + A'.B.C + A.B.C' + A.B.C$$

(d) Reduce the following Boolean expression using K - Map : 3

$$F(A, B, C, D) = \Pi (0,1,2,3,4,5,10,11,15)$$

Ans)

$$F(A, B, C, D) = \sum (6, 7, 8, 9, 12, 13, 14)$$

	A'B'	AB	AB	A'B'
C'D'	0	4	1 12	1 8
C'D	1	5	1 13	1 9
C.D	3	1 7		15
C.D'	2	1 6	1 14	10

$$F(A, B, C, D) = A.C' + A'.B.C + B.C.D'$$

OR

	C'D'	C'D	C.D	C.D'
A'B'	0	1	3	2
AB	4	5	1 7	1 6
A.B	1 12	1 13	15	1 14
A.B'	1 8	1 9	11	10

$$F(A, B, C, D) = A.C' + A'.B.C + B.C.D'$$

OR

	A+B	A+B'	A'+B'	A'+B
C+D	0 0	0 4	12	8
C+D'	0 1	0 5	13	9
C'+D'	0 3	7	0 15	0 11
C'+D	0 2	6	14	0 10

$$F(A, B, C, D) = (A+C).(B+C').(A'+C'+D')$$

OR

	C+D	C+D'	C'+D'	C'+D
A+B	0 0	0 1	0 3	0 2
A+B'	0 4	0 5	7	1 6
A'+B'	12	13	0 15	14
A'+B	8	9	0 11	0 10

$$F(A, B, C, D) = (A+C).(B+C').(A'+C'+D')$$

2004:

6.(a) State and prove the Absorption law algebraically.

(b) Give the following truth table, derive a sum of product (SOP) and Product of Sum (POS) Form of Boolean expression from it:

A	B	C	F(A,B,C)
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	0

(c) Obtain a simplified form for the following Boolean Expression using Karnaugh Map:

$$F(a,b,c,d) = \sum(0,1,2,4,5,7,8,9,10,11,14)$$

d) Draw the logic circuit for a Half Adder using NAND gates Only. (**Out of Syllabus now**)

2003:

6. (a) State De Morgan's Laws. Verify one of the De Morgan's Laws using a truth table.

(b) Verify $X.Y'Z + X.Y'Z' + X'.Y'Z = X.Y' + Y'.Z$ algebraically.

(c) Write the dual of the Boolean Expression: $(B'+C).A$

(d) Obtain a simplified form for a Boolean Expression:

$$F(U,V,W,Z) = \sum(0,2,3,4,7,9,10,13,14,15)$$

(e) Draw the logic circuit for a half adder. (**Out of Syllabus now**)

2002:

6. (a) State the Distributive law and verify the law using Truth table. 1

(b) Prove $XY + YZ + Y'Z = XY + Z$, algebraically. 2

(c) Obtain the simplified form, of a Boolean expression using Karnaugh map. 2

$$F(w,x,y,z) = \sum(2,3,6,10,11,14)$$

(d) Represent the Boolean expression $(X+Y)(Y+Z)(X+Z)$ with help of NOR gates only. 1

(e) Given the following truth table, write the product of sums form of the function.

X	Y	Z	F
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

2001:

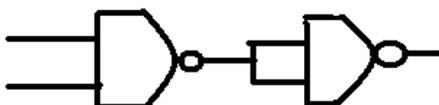
6. (a) State and verify Duality Principle.

(b) Prove algebraically: $x'y'z' + x'y'z + x'yz' + x'yz = x' + y'$

(c) If $F(a,b,c,d) = \prod(0,1,3,4,5,7,8,9,11,12,13,15)$, Obtain the simplified form using K-map.

(d) Seven inverters are cascaded one after another. What is the output if the input is 1?

(e) Given the following circuit:



What if the output if (i) both inputs are FALSE(0) (ii) one is FALSE and the other is TRUE.

(f) Derive the expression for a Full Adder (Out of syllabus now).

2000:

6. (a) State Absorption Laws. Verify one of the Absorption Laws using a truth table.

(b) Prove $X'Y + Y'Z = X'Y.Z + X'.Y'.Z' + X'.Y'.Z + X'.Y'.Z$ algebraically.

(c) Obtain simplified form for a boolean expression $F(x,y,z,w) = \sum(1,3,4,5,7,9,11,12,13,15)$ using Karnaugh Map.

(d) Draw the logic circuit for a half adder (Out of syllabus now).

(e) Represent the Boolean expression $XY + Y'Z$ with the help of NAND gates only.

(f) Write the Sum of Products form of the function $G(U,V,W)$. Truth table representation of G is as follows:

U	V	W	G
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

1999:

6.(a) State the distributive law. Verify the law using truth table.

(b) Prove $x + x'y = x + y$ algebraically.

(c) Write the dual of the Boolean expression $(x+y).(x'+y')$

(d) Minimise $F(w,x,y,z)$ using Karnaugh map.

$$F(w,x,y,z) = \Sigma (0,4,8,12)$$

(e) Draw the logic circuit for a half-adder. **(Out of syllabus now)**

(f) Represent the Boolean expression $(x+y)(y+z)(z+x)$ with the help of NOR gates only.

Q 6 (g) Write sum of product form of the function $F(x,y,z)$. The truth table representation for the function F is given below:

X	Y	Z	f
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

1998:

6 (a) State Demorgan's laws. Verify one of the Demorgan's laws using truth tables.

(b) Prove $X+Y'Z=(X+Y'+Z')(X+Y'+Z)$ algebraically.

(c) Write the dual of the Boolean expression $(U+W)(V'U+W)$

(d) Obtain a simplified form for a Boolean expression:

$$F(U, V, W, Z) =$$

$$\pi 0,1,3,5,7,9,10,11,12,13,14,15)$$

(e) Draw the logic circuit for a half-adder **(Out of syllabus now)**.

(f) Represent the Boolean expression

$X+Y.Z'$ with the help of NOR gates only.

(g) Write the Product of Sum form of the function $H(U,V,W)$, truth table representation of H is as follows:

U	V	W	H
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

Model Paper 1 for 2008-09:

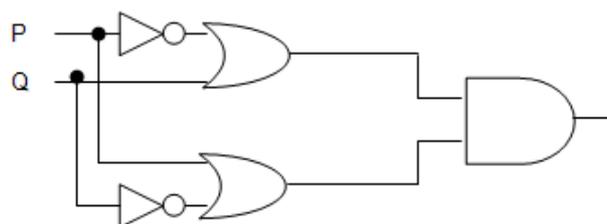
6.(a) State & verify Demorgan's Laws.2
Ans)

$(X+Y)'$	$=X'.Y'$
$(X.Y)'$	$=X'+Y'$

X	Y	X+Y	(X+Y)'	X'	Y'	X'.Y'	X.Y	(X.Y)'	X'+Y'
0	0	0	1	1	1	1	0	1	0
0	1	1	0	1	0	0	0	1	0
1	0	1	0	0	1	0	0	1	0
1	1	1	0	0	0	0	1	0	1

(b) Write the equivalent Boolean Expression for the following Logic Circuit

2



Ans)

$F(P,Q)=(P'+Q).(P+Q')$

c) Write the POS form of a Boolean function F, which is represented in a

truth table as follows:

U	V	W	F
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

Ans)

$$F(U,V,W) = (U+V+W').(U+V'+W').(U'+V+W')$$

(d) Reduce the following Boolean Expression using K-Map: 3

$$F(A,B,C,D) = \Sigma (0,1,2,4,5,6,8,10)$$

Ans)

	A'B'	A'B	AB	AB'
C'D'	1	1		1
C'D	1	1		
CD				
CD'	1	1		1

$$F(A,B,C,D) = A'C' + A'D' + B'D'$$

Model Paper 2 for 2008-09:

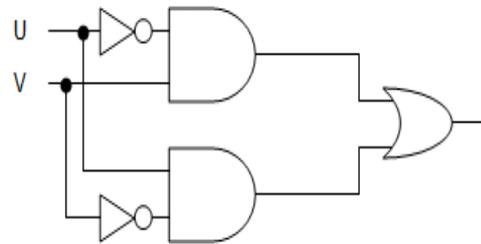
6.(a) State and algebraically verify Absorbion Laws. 2

Ans)

$X+X.Y = X$	L.H.S =	$X+X.Y$	=	$X.1+X.Y$	=	$X.(1+Y)$	=	$X.1$	=	X	=	R.H.S
$X+X'.Y = X+Y$	L.H.S =	$X+X'.Y$	=	$X+(X'.Y)$	=	$(X+X').Y$	=	$1.Y$	=	Y	=	$X+Y$

=	1.(X+Y)
=	X+Y
=	R.H.S

(b) Write the equivalent Boolean Expression for the following Logic Circuit 2



Ans)

$$F(U,V) = U'.V + U.V'$$

c) Write the SOP form of a Boolean function G, which is represented in a truth table as follows: 1

P	Q	R	G
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

Ans)

$$G(P,Q,R) = P'.Q.R' + P.Q'.R' + P.Q.R' + P.Q.R$$

d) Reduce the following Boolean Expression using K-Map:

$$F(U,V,W,Z) = \Pi (0,1,2,4,5,6,8,10)$$

Ans)

	U'V'	U'V	UV	UV'
W'Z'	0	4	12	8
W'Z	1	5	13	9
WZ	3	7	15	11
WZ'	2	6	14	10

$$F(U,V,W,Z) = UV + WZ + UZ$$

Other Important Paper:

6. (a) State and verify Distributive law in Boolean Algebra. 2

(b) Draw a logical circuit diagram for the following Boolean expression: $A'(B+C)$ 1

(c) Convert the following Boolean expression into its equivalent Canonical Sum of Product Form (SOP): 2
 $(U'+V'+W').(U+V'+W').(U+V+W)$.

(d) Reduce the following Boolean Expression using K-Map: 3

$$F(A,B,C,D) = \prod (1,3,4,5,7,9,11,12,13,14)$$

MODEL PAPER 1 2009-10:

6.a) State and verify Demorgan's Laws algebraically. 2

Ans)

$$(X+Y)' = X'.Y'$$

Verification

$$(X+Y).(X+Y)' = X'.Y'.(X+Y)$$

$$0 = X'.Y'.X + X'.Y'.Y$$

$$0 = X'.X.Y' + X'.0$$

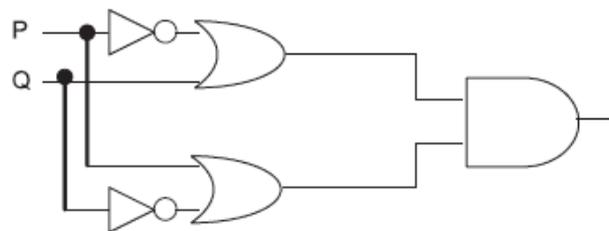
$$0 = 0.Y' + 0$$

$$0 = 0 + 0$$

$$0 = 0$$

$$L.H.S = R.H.S$$

b) Write the equivalent Boolean Expression for the following Logic Circuit 2



Ans)

$$F(P,Q) = (P'+Q).(P+Q')$$

c) Write the POS form of a Boolean function F, which is represented in a truth table as follows: 1

U	V	W	F
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

Ans)

$$F(U,V,W) = (U+V+W).(U+V'+W').(U'+V+W')$$

d) Reduce the following Boolean Expression using K-Map: 3

$$F(A,B,C,D) = \sum (0,1,2,4,5,6,8,10)$$

Ans)

	A'B'	A'B	AB	AB'
C'D'	1	1	4	12
C'D	1	1	5	13
CD	3	7	15	11
CD'	1	1	6	14
	2	6	14	10

$$F(A,B,C,D) = A'C' + A'D' + B'D'$$

MODEL PAPER 2 2009-10:

6.a) State and algebraically verify Absorption Laws. 2

Ans)

$$\begin{aligned}
 X+X.Y &= X \\
 \text{L.H.S} &= X+X.Y \\
 &= X.1+X.Y \\
 &= X.(1+Y) \\
 &= X.1 \\
 &= X \\
 &= \text{R.H.S}
 \end{aligned}$$

$$\begin{aligned}
 X+X'.Y &= X+Y \\
 \text{L.H.S.} &= X+X'.Y \\
 &= (X+X').(X+Y) \\
 &= 1.(X+Y) \\
 &= X+Y \\
 &= \text{R.H.S}
 \end{aligned}$$

	U'V'	U'V	UV	UV'
W'Z'	0	4	1 12	8
WZ	1	8	1 3	9
WZ	1 3	1 7	1 5	11
WZ'	2	6	1 14	10

$$F(U,V,W,Z)=UV+WZ+UZ$$

b) Write the equivalent Boolean Expression for the following Logic Circuit 2

Ans) $F(U,V)=U'.V+U.V'$

c) Write the SOP form of a Boolean function G, which is represented in a truth table as follows: 1

P	Q	R	G
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

Ans)

$$F(P,Q,R) = P'.Q'R'+P'.Q'R+P'.Q.R+P.Q'.R$$

d) Reduce the following Boolean Expression using K-Map: 3

$$F(U,V,W,Z)= \Pi (0,1,2,4,5,6,8,10)$$

Ans)

- (i) bps
- (ii) abps
- (iii) gbps
- (iv) kbps

Ans. (ii)abps

(c) What is the difference between Trojan Horse and Virus in terms of computers? **1**

Ans.

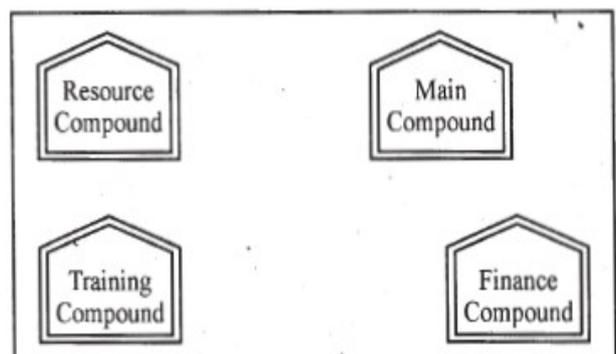
TROJAN HORSE: “Malware” computer programs presented as useful or harmless in order to induce the user to install and run them.

VIRUS: Virus is a malicious program that damages data and files and causes harm to computer system.

(d) What term we use for a software/hardware device, which is used to block, unauthorized access while permitting authorized communications. This term is also used for a device or set of devices configured to permit, deny, encrypt, decrypt, or proxy all (in and out) computer traffic between different security domains based upon a set of rules and other criteria. **1**

Ans. Firewall

(e) “Learn Together” is an educational NGO. It is setting up its new campus at Jabalpur for its webbased activities. The campus has 4 compounds as shown in the diagram below:



14.COMMUNICATION AND NETWORK CONCEPTS

DELHI 2010:

7. (a) What was the role of ARPANET in the Computer Network? **1**

Ans. The first computer network was jointly designed by The Advanced-Research Projects Agency (ARPA) and Department of Defence (DoD) of United States in 1969 and was called ARPANET. It was an experimental project, which connected a few computers from some of the reputed universities of USA and DoD. ARPANET allowed access to computer resource sharing projects. This ARPANET was handed over to Defence Communication Agency (DCA) for further development.

(b) Which of the following is not an unit for data transfer rate? **1**

Center to center distances between various Compounds as per architectural drawings (in Metre) is as follows :

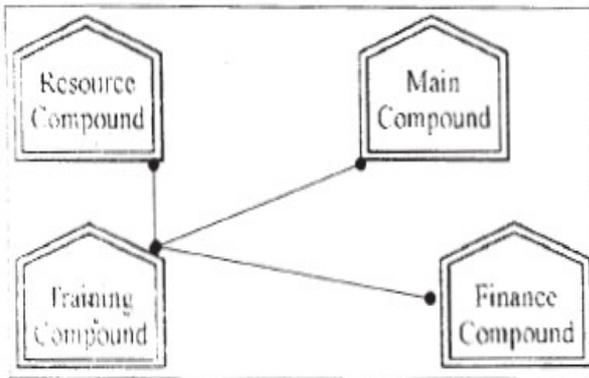
Main Compound to Resource Compound	110 m
Main Compound to Training Compound	115 m
Main Compound to Finance Compound	35 m
Resource Compound to Training Compound	25 m
Resource Compound to Finance Compound	135 m
Training Compound to Finance Compound	100 m

Expected Number of Computers in each Compound is as follows :

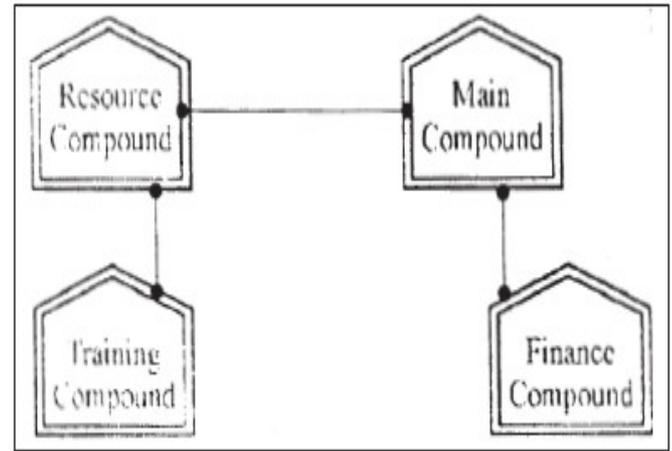
Main Compound	5
Resource Compound	15
Training Compound	150
Accounts Compound	20

(e1) Suggest a cable layout of connections between the compounds.

Ans.



OR



(e2) Suggest the most suitable place (i.e. compound) to house the server for this NGO. Also, provide a suitable reason for your suggestion. 1

Ans. Training Compound as it contains maximum number of computers.

(e3) Suggest the placement of the following devices with justification : 1

- (i) Repeater
- (ii) Hub/Switch

Ans.

(i) A Repeater should be placed when the distance between any two connecting compounds exceeds 70 m.

(ii) Every compound will need one Hub / Switch, to send signals to all of the workstations connected to it

OR

Any diagrammatic representation with valid justification

(e4) The NGO is planning to connect its International office situated in Mumbai, which out of the following wired communication link, you will suggest for a very high speed connectivity? 1

- (i) Telephone Analog Line
- (ii) Optical Fiber
- (iii) Ethernet Cable

Ans. (ii) Optical Fiber

(f) Write the full forms of the following: 1

- (f1) GNU
- (f2) XML

Ans. (f1) GNU's not Unix
(f2) eXtensible Markup Language

(g) Write one advantage of each for Open Source Software and Proprietary Software. 1

Ans. An Open Source Software is freely and liberally licensed because of which users have right to study, change, and improve its design and source code. A Proprietary Software has a copyright owner, who can restrict the user's control over the software, its modification, or restrictions in publishing of modified or unmodified versions.

OUTSIDE DELHI 2010:

7. (a) What was the role of ARPANET in the Computer Network? 1

Ans. The first computer network was jointly designed by The Advanced Research Projects Agency (ARPA) and Department of Defence (DoD) of United States in 1969 and was called ARPANET. It was an experimental project, which connected a few computers from some of the reputed universities of USA and DoD. ARPANET allowed access to computer resource sharing projects. This ARPANET was handed over to Defence Communication Agency (DCA) for further development.

(b) Which of the following is not a unit for data transfer rate? 1

- (i) mbps
- (ii) kbps
- (iii) sbps
- (iv) gbps

Ans. (iii) sbps

(c) What is the difference between Virus and Worms in the computers? 1

Ans.

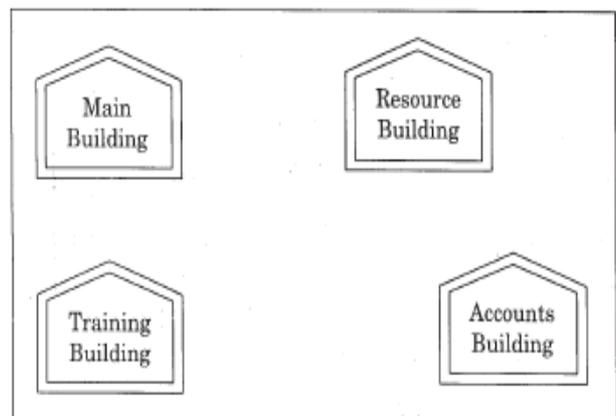
Virus: Virus is a malicious program that damages data and files and causes harm to computer system.

Worms: Worms disrupt services and create system management problems. In some cases worms can install viruses that cause damage to system.

(d) What term do we use for a software/hardware device, which is used to block unauthorized access while permitting authorized communications? This term is also used for a device or set of devices configured to permit, deny, encrypt, decrypt, or proxy all (in and out) computer traffic between different security domains based upon a set of rules and other criteria. 1

Ans. Firewall

(e) "Vidya for All" is an educational NGO. It is setting up its new campus at Jaipur for its web-based activities. The campus has four buildings as shown in the diagram below: 4



Center to center distances between various buildings as per architectural drawings (in meters) is as follows:

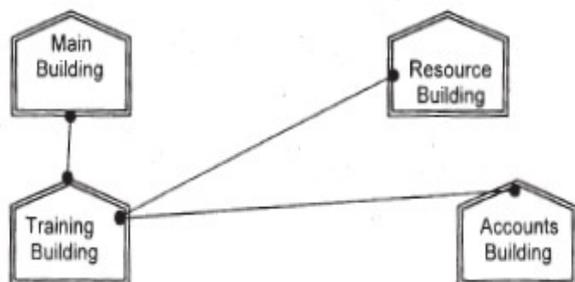
Main Building to Resource Building	120 m
Main Building to Training Building	40 m
Main Building to Accounts Building	135 m
Resource Building to Training Building	125 m
Resource Building to Accounts Building	45 m
Training Building to Accounts Building	110 m

Expected Number of Computers in each Building is as follows:

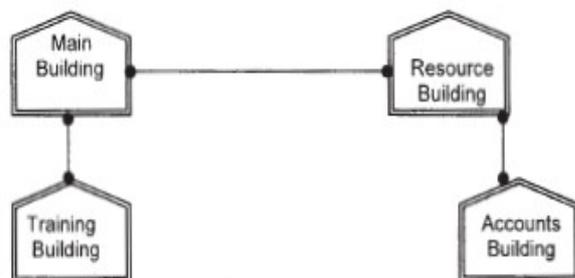
Main Building	15
Resource Building	25
Training Building	250
Accounts Building	10

(e) Suggest a cable layout of connections between the buildings.

Ans.



OR



(e2) Suggest the most suitable place (i.e. building) to house the server for this NGO. Also, provide a suitable reason for your suggestion.

Ans. Training Building as it contains maximum number of computers.

(e3) Suggest the placement of the following devices with justification:

- (i) Repeater
- (ii) Hub/Switch

Ans.

- (i) A Repeater should be placed when the distance between any two connecting buildings exceeds 70 m.
- (ii) Every building will need one Hub / Switch, to send signals to all of the workstations connected to it

(e4) The NGO is planning to connect its International office situated in Delhi. Which out of the following wired communication links, will you suggest for a very high speed connectivity ?

- (i) Telephone Analog Line
- (ii) Optical Fiber
- (iii) Ethernet Cable

Ans. (ii) Optical Fibre

(f) Write the full forms of the following: 1

- (f1) FTP
- (f2) FSF

Ans.

- (f1) FILE TRANSFER PROTOCOL
- (f2) FREE SOFTWARE FOUNDATION

(g) Name any two common Web browsers. 1

Ans.

- Internet explorer
- Firefox
- Netscape
- Chrome
- Opera
- Safari
- OR any other Web Browser

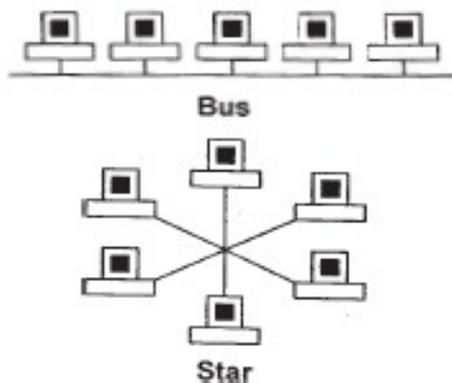
DELHI 2009:

7. (a) What is difference between Star Topology and Bus Topology of network? 1

Ans)

Bus Topology: It is characterised by common transmission medium shared by all the connected hosts, managed by dedicated nodes. It offers simultaneous flow of data and control.

Star Topology: It is characterised by central switching node (communication controller) and unique path (point to point link) for each host. It is easy to add and remove additional hosts by upgrading the centralised node.



(b)Expand the following abbreviations 1

- (i) GSM
- (ii) CDMA

Ans

- (i) Global System for Mobile Communication
- (ii) Code Division Multiple Access

(c) What is protocol? Which protocol is used to search information from internet using an internet browser? 1

Ans A protocol is the set of rules for governing communication between two communication devices. It also infers documentation, negotiations and establishment of rules. Protocol used to search information from internet using an internet browser is :

TCP/IP OR HTTP

(d) Name two switching techniques used to transfer data between two terminals(computers).1

Ans Message Switching and Packet Switching

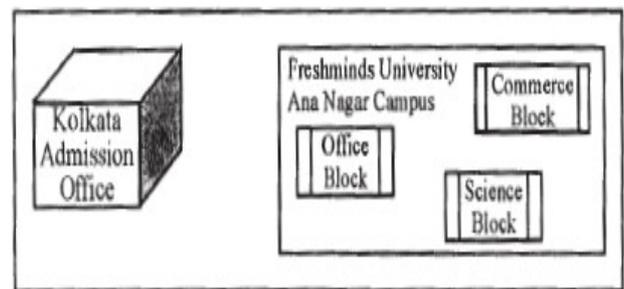
OR

Circuit Switching and Message Switching

OR

Circuit Switching and Packet Switching

(e) Freshminds University of India is starting its first campus in Ana Nagar of South India with its center admission office in Kolkata. The university has 3 major blocks comprising of Office Block, Science Block and Commerce Block in the 5 KM area Campus. As a network expert, you need to suggest the network plan as per (E1) to (E4) to the authorities keeping in mind the distance and other given parameters.



Expected Wire distances between various locations:

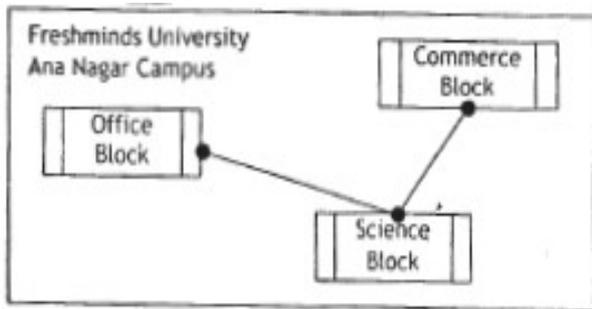
Office Block to Science Block	90 m
Office Block to Commerce Block	80 m
Science Block to Commerce Block	15 m
Kolkata Admission office to Ana Nagar Campus	2450 km

Expected number of Computers to be installed at various locations in the University are as follows:

Office Block	10
Science Block	140
Commerce Block	30
Kolkata Admission office	8

(E1) Suggest the authorities, the cable layout amongst various blocks inside university campus for connecting the blocks. 1

Ans)



(E2) Suggest the most suitable place (i.e. block) to house the server of this university with a suitable reason. 1

Ans) Science Block as it contains maximum number of computers.

Note: 1 mark if Commerce Block is written with valid justification eg. Minimum wiring needed

(E3) Suggest an efficient device from the following to be installed in each of the blocks to connect all the computers: 1

- (i) MODEM
- (ii) SWITCH
- (iii) GATEWAY

Ans SWITCH

(E4) Suggest the most suitable. (very high speed) service to provide data connectivity between Admission Office located in Kolkata and the campus located in Ana Nagar from the following options: 1

- _ Telephone line
- _ Fixed-Line Dial-up connection
- _ Co-axial Cable Network
- _ GSM
- _ Leased line
- _ Satellite Connection

Ans Satellite Connection
OR

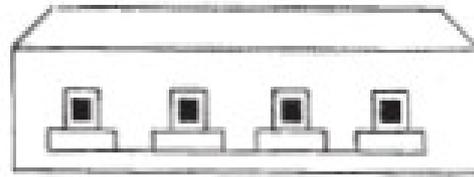
Leased line

OUTSIDE DELHI 2009:

7. (a) What is the difference between LAN and WAN? 1

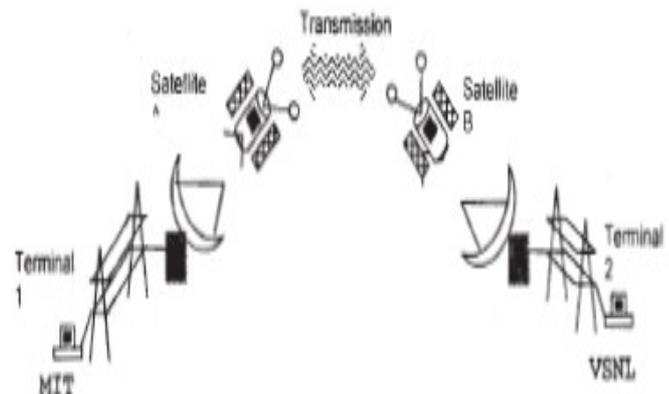
Ans LAN (Local Area Network):

Interconnects a high number of access or node points or stations within a confined physical area. An example is the territory covered in a single office building that houses various departments/offices. All these areas are interconnected using a LAN.



WAN (Wide Area Network)

It is used to connect systems with no limitation of geographical area. It is used to serve many locations distributed over a large geographical area. A system of overnight teller machines used by a banking organisation covering the North of India is an example of a WAN. Internet is also an example of the same.



b) Expand the following abbreviations: 1

- (i) HTTP
- (ii) ARPANET

Ans

- (i) Hyper Text Transfer Protocol
- (ii) Advanced Research Projects Agency Network

(c) What is protocol? Which protocol is used to copy a file from/to a remotely located server? 1

Ans A protocol is the set of rules for governing communication between two communication devices. It also infers documentation, negotiations and establishment of rules. Protocol used to copy a file from/to a remotely located server is FTP (File Transfer Protocol)

(d) Name two switching techniques used to transfer data between two terminals (computers). 1

Ans Message Switching and Packet Switching

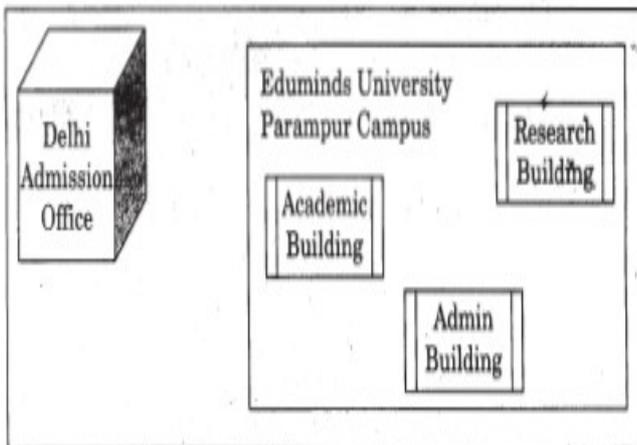
OR

Circuit Switching and Message Switching

OR

Circuit Switching and Packet Switching

(e) Eduminds University of India is starting its first campus in a small town Parampur of Central India with its center admission office in Delhi. The university has 3 major buildings comprising of Admin Building, Academic Building and Research Building in the 5 KM area Campus. As a network expert, you need to suggest the network plan as per (E1) to (E4) to the authorities keeping in mind the distances and other given parameters.



Expected Wire distances between various locations:

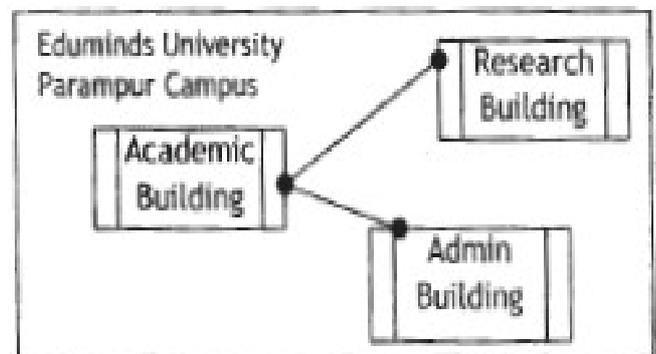
Research Building to Admin Building	90m
Research Building to Academic Building	80m
Academic Building to Admin Building	15m
Delhi Admission Office to Parampur Campus	1450 km

Expected number of computers to be installed at various locations in the university are as follows:

Research Building	20
Academic Building	150
Admin Building	35
Delhi Admission Office	5

(E1) Suggest to the authorities, the cable layout amongst various buildings inside the university campus for connecting the buildings. 1

Ans)



(E2) Suggest the most suitable place (i.e. building) to house the server of this organisation, with a suitable reason. 1

Ans Academic Building as it contains maximum number of computers.

Note: 1 mark if any suitable place/building is suggested with valid justification

(E3) Suggest an efficient device from the following to be installed in each of

the buildings to connect all the computers : 1

- (i) GATEWAY
- (ii) MODEM
- (iii) SWITCH

Ans SWITCH

(E4) Suggest the most suitable (very high speed) service to provide data connectivity between Admission Building located in Delhi and the campus located in Par am pur from the following options: 1

- _ Telephone line
- _ Fixed-Line Dial-up connection
- _ Co-axial Cable Network
- _ GSM
- _ Leased line
- _ Satellite Connection

Ans

Satellite Connection

OR

Leased line

DELHI 2008:

1) What is a Hub? 1

Ans)

A Hub is used for a central connection between two or more computers on a network.

OR

A Hub is a network device used to connect two or more computers.

OR

A Hub is an unintelligent network device to connect computers.

2) Expand the following terms with respect to Networking: 2m

- i) MODEM ii) WLL
- iii) FTP iv) TCP/IP

Ans)

- (i) Modulator - Demodulator
- (ii) Wireless Local Loop

OR

- Wireless in Local Loop
- (iii) File Transfer Protocol
- (iv) Transfer Control Protocol/Internet Protocol

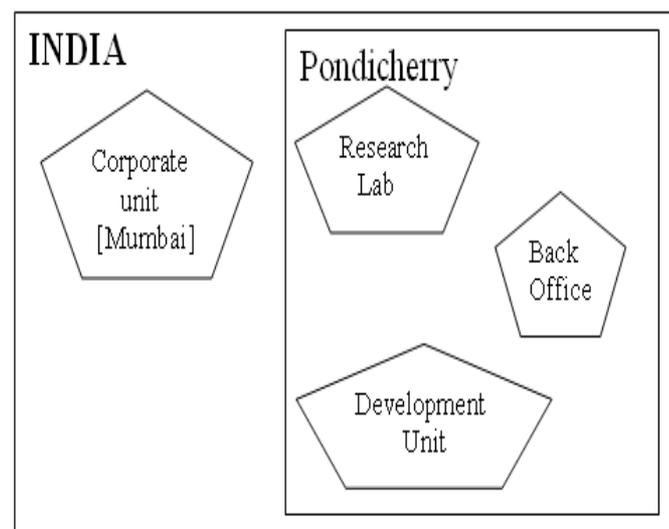
3) How is Coaxial cable different from Optical Fibre? 1m

Ans)

Coaxial Cable: Comparatively Slow, Economic, convenient to lay down, used in Bus topology of networks

Optical Fibre: Very fast, expensive, reliable, no interference

4) "Bias methodologies" is planning to expand their network in India, starting with three cities in India to build infrastructure for research and development of their chemical products. The company has planned to setup their main office in Pondicherry - at three different locations and have named their offices as "Back Office", "Research Lab" and "Development Unit". The company has one more Research office namely "Corporate Office" in "Mumbai". A rough layout of the same is as follows:



Approximate distance between these offices is as follows:

From	To	Distance
Research Lab	Back Office	111 Mtr
Research Lab	Development Unit	16 KM
Research Lab	Corporate Unit	1800 KM
Back Office	Development Unit	13 KM

In continuation of the above, the company experts have planned to install the following number of computers in each of their offices:

Research Lab	158
Back Office	79
Development Unit	90
Corporate Unit	51

1) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting each of the following office units:

- i) Research Lab and Back Office
- ii) Research Lab and Development Unit

Ans)

Research Lab and Back Office - LAN
 Research Lab and Development Unit - MAN

2) Which one of the following devices will you suggest for connecting all the computers within each of their office units?

- i) Switch/Hub
- ii) Modem
- iii) Telephone

Ans)

Switch / Hub

3) Which of the following communication media, you will suggest to be procured by the company for connecting their local office units in Pondicherry for very effective (High Speed) communication?

- i) Telephone cable
- ii) Optical Fibre
- iii) Ethernet Cable

Ans)

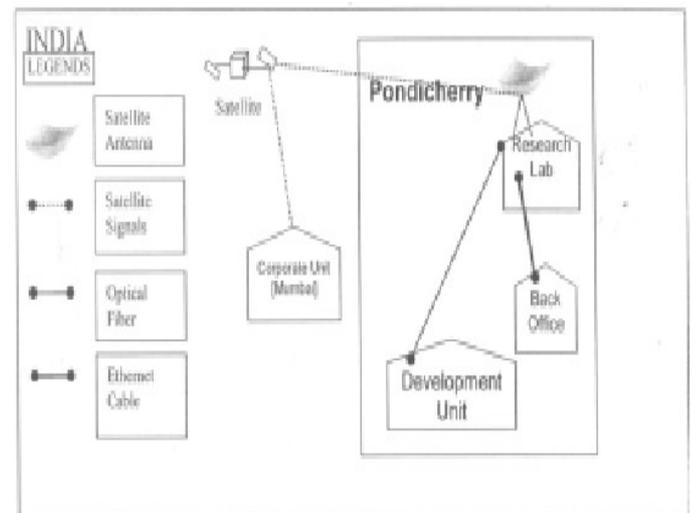
Optical Fibre

iv) Suggest a cable/wiring layout for connecting the company's local office units located in Pondicherry. Also, suggest an effective method/technology for connecting the company's office unit located in Mumbai.

Ans)

Local office units at Pondicherry to be connected using LAN / MAN / star Topology / Tree Topology

Mumbai Office to be connected using Satellite/WAN



OUTSIDE DELHI: 2008

1) What is a Modem? 1m

Ans)

Modem is a Modulation Demodulation device that converts analog signal to digital signal and vice versa.

2) Expand the following terms with respect to Networking: 2m

- i) PPP
- ii) GSM
- iii) XML
- iv) HTTP

Ans)

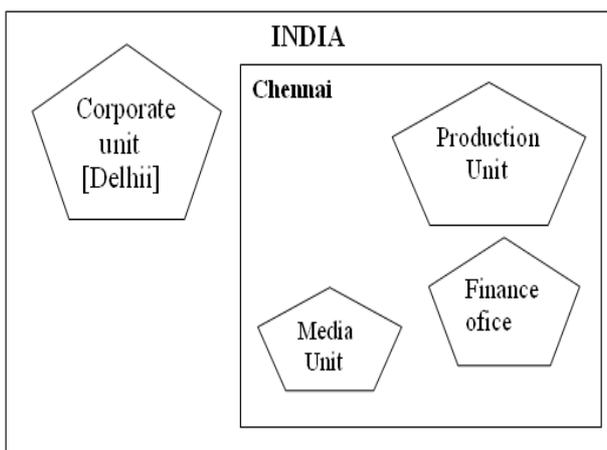
- (i) Point To Point Protocol
- (ii) Global System for Mobile Communication
- (iii) eXtensible Markup Language
- (iv) Hyper Text Transfer Protocol

3) How is a Hacker different from a Cracker? 1

Ans)

Hackers are the ones who get into someone's code or computer without any malicious intentions, whereas Crackers are the ones who get into someone's code or computer with malicious intentions.

4) "China Middleton Fashion" is planning to expand their network in India, starting with two cities in India to provide infrastructure for distribution of their product. The company has planned to setup their main office in Chennai at three different locations and have named their offices as "Production Unit", "Finance Unit" and "Media Unit". The Company has its corporate unit in Delhi. A rough layout of the same is as follows:



Approximate distance between these Units is as follows:

From	To	Distance
Production Unit	Finance Unit	70 Mtr
Production Unit	Media Unit	15 KM
Production Unit	Corporate Unit	2112 KM
Finance Unit	Media Unit	15 KM

In continuation of the above, the company experts have planned to install the following number of computers in each of their offices:

Production Unit	158
Finance Unit	79
Media Unit	90
Corporate Unit	51

1) Suggest the kind of network required (out of LAN, MAN, WAN) for connecting each of the following office units:

- i) Production Unit and Media Unit
- ii) Production Unit and Finance Unit

Ans)

Production Unit and Media Unit : **MAN**

Production Unit and Finance Unit : **LAN**

2) Which one of the following devices will you suggest for connecting all the computers within each of their office units?

- i) Switch/Hub
- ii) Modem
- iii) Telephone

Ans)

Switch / Hub

3) Which of the following communication media, you will suggest to be procured by the company for connecting their local office units in Chennai for very effective (High Speed) communication?

- i) Telephone cable
- ii) Optical Fibre

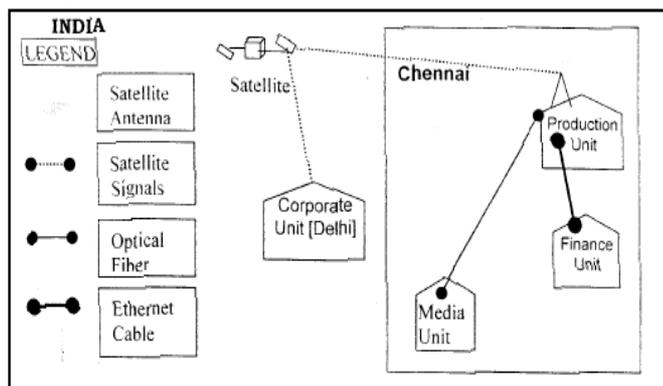
iii) Ethernet Cable

Ans)

Optical Fibre

4) Suggest a cable/wiring layout for connecting the company's local office units located in Chennai. Also, suggest an effective method/technology for connecting the company's office unit located in Delhi.

Ans)



Optical Fiber/Star Topology

Wireless/Satellite Link/leased Line

DELHI 2007:

1) What is the significance of Cyber law? 1m

Ans)

Cyber law encompasses a wide variety of political and legal issues related to the Internet and other communications technology, including intellectual property, privacy, freedom of expression, and jurisdiction.

OR

Cyber law helps prevent Cyber Crime, Hacking, Data theft, Software Piracy and protects rights of Cyber Users.

2) Expand the following terms with respect to networking: 2m

- i) CDMA ii) WLL
- iii) FTP iv) HTML

Ans)

- (i) Code Division Multiple Access
- (ii) Wireless Local Loop
- (iii) File Transfer Protocol
- (iv) Hyper Text Markup Language

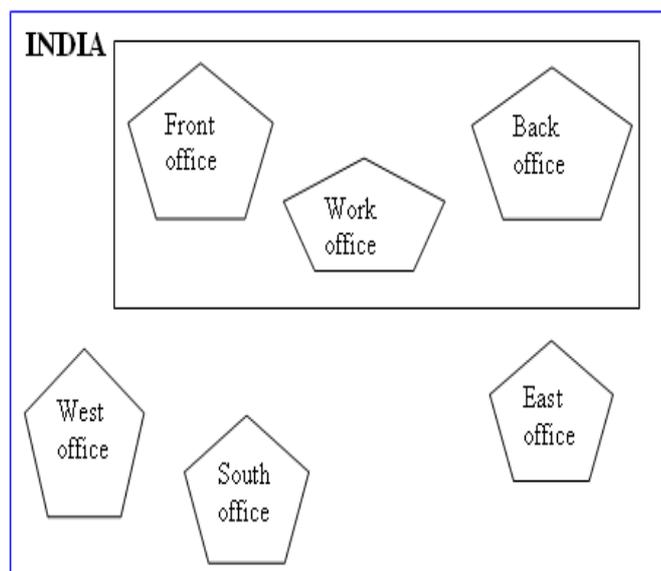
3) Which of the following unit measures the speed with which data can be transmitted from one node to another node of a network? Also, give the expansion of the suggested unit. 1

- i) Mbps ii) KMps
- iii) MGps

Ans)

Mbps (Mega Bits Per Second)

4) "Bhartiya Connectivity Association" is planning to spread their offices in four major cities in India to provide regional IT infrastructure support in the field of Education & Culture. The company has planned to setup their head office in New Delhi in three locations and have named their New Delhi offices as "Front Office", "Back Office" and "Work Office". The company has three more regional offices as "South Office", "East Office" and "West Office" located in other three major cities of India. A rough layout of the same is as follows: 4m



Approximate distance between these offices as per network survey team is as follows

Place From	Place To	Distance
Back Office	Front Office	10 KM

Back Office	Work Office	70 KM
Back Office	East Office	1291KM
Back Office	West Office	790 KM
Back Office	South Office	1952KM

In continuation of the above, the company experts have planned to install the following number of computers in each of their offices:

Back Office	100
Front Office	20
Work Office	50
East Office	50
West Office	50
South Office	50

1) Suggest network type(out of LAN,MAN,WAN) for connecting each of the following set of their offices:

- Back Office and Work Office
- Back Office and south Office

Ans)

Back Office and Work Office – LAN
 Back Office and South Office – WAN

2) Which device you will suggest to be produced by the company for connecting all the computers with in each of their offices out of the following devices?

- Switch/Hub
- Modem
- Telephone

Ans)

Switch / Hub

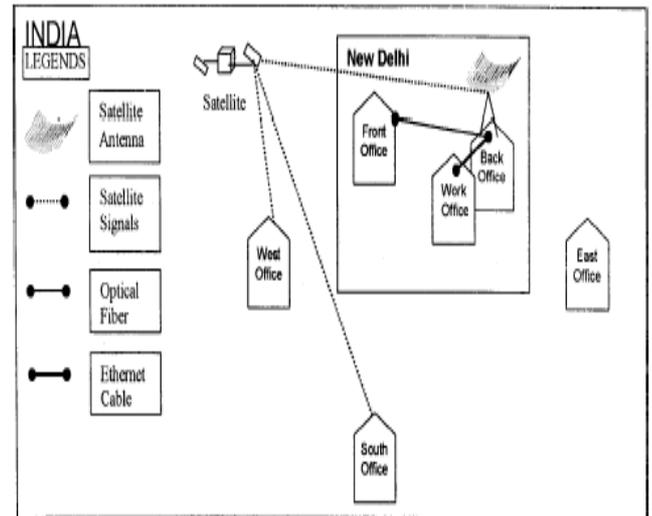
3) Which of the following communication medium, you will suggest to be produced by the company for connecting their offices in New Delhi for very effective and fast communication?

- Telephone Cable
- Optical Fibre
- Ethernet Cable

Ans) Optical Fibre

4) Suggest a cable/writing layout for connecting the company’s local offices located in New Delhi. Also, suggest an effective method /technology for connecting the company’s regional offices –“East Office”, “West Office” and “South Office” with offices located in New Delhi.

Ans)



OR

Any other suitable layout / topology drawn or explained.

Optical Fiber/Star Topology

OR

Optical Fiber/Bus Topology

OR

Wireless

OUT SIDE DELHI 2007:

1) What is the significance of Cyber law? 1m

Ans)

Cyber law encompasses a wide variety of political and legal issues related to the Internet and other communications technology, including intellectual property, privacy, freedom of expression, and jurisdiction.

OR

Restricting unauthorized access to user accounts. Promoting, coordinating and controlling e-business.

2) Expand the following terms with respect to networking: 2m

- i) XML ii) WWW
- iii) WLL iv) TCP/IP

Ans)

- (i) XML eXtensible Markup Language
- (ii) WWW World Wide Web
- (iii) WLL Wireless in Local Loop
- (iv) TCP/IP Transmission Control Protocol/Internet Protocol

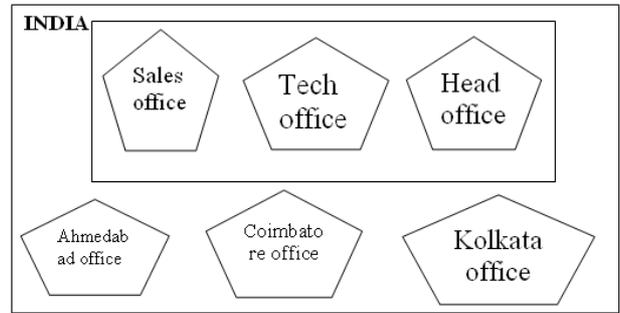
3) Which of the following unit measures the speed with which data can be transmitted from one node to another node of a network? Also, give the expansion of the suggested unit

- i) KMps ii) Mbps
- iii) MGps

Ans)

- (ii) Mbps
Mega bits per second

4) "Hindustan Connecting World Association" is planning to start their offices in four major cities in India to provide regional IT infrastructure support in the field of Education & Culture. The company has planned to set up their head office in New Delhi in three locations and have named their New Delhi offices as "Sales Office", "Head Office" and "Tech Office". The company's regional offices are located at "Coimbatore", "Kolkata" and "Ahmadabad". A rough layout of the same is as follows: 4m



Approximate distance between these offices as per network survey team is as follows

Place From	Place To	Distance
Head Office	Sales Office	10 KM
Head Office	Tech Office	70 KM
Head Office	Kolkata Office	1291KM
Head Office	Ahmadabad Office	790 KM
Head Office	Coimbatore Office	1952KM

In continuation of the above, the company experts have planned to install the following number of computers in each of their offices:

Head Office	100
Sales Office	20
Tech Office	50
Kolkata Office	50
Ahmadabad Office	50
Coimbatore Office	50

1) Suggest network type(out of LAN,MAN,WAN) for connecting each of the following set of their offices:

- Head Office and Tech Office
- Head Office and Coimbatore Office

Ans)

- Head Office and Tech Office: **LAN**
- Head Office and Coimbatore Office: **WAN**

2) Which device you will suggest to be produced by the company for connecting all the computers with in each of their offices out of the following devices?

Modem
Telephone
Switch/Hub

Ans)

Switch / Hub

3) Which of the following communication media, will suggest to be procured by the company for connecting their local offices in New Delhi for very effective and fast communication?

Ethernet Cable, Optical Fibre, Telephone Cable

Ans)

Optical Fibre

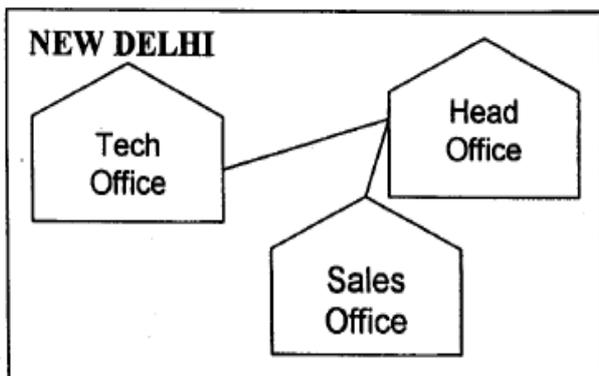
O

O

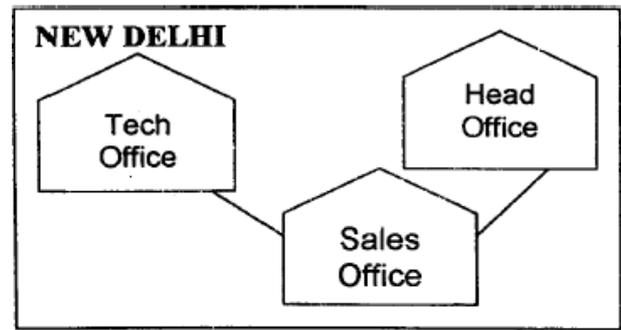
4) Suggest a cable/writing layout for connecting the company's local offices located in New Delhi. Also, suggest an effective method /technology for connecting the company's regional offices at "Kolkata", "Coimbatore" and "Ahmadabad".

Ans)

Optical Fiber/Star Topology
Wireless



OR



Optical Fiber/Bus Topology
Wireless

DELHI: 2006

1) Differentiate between Internet and Intranet 1

Ans)

Internet is a network of computer networks which operates world-wide using a common set of communications protocols.

Intranet is an inter-connected network within one organization that uses Web technologies for the sharing of information internally.

2) Expand the following terms: 2m
i) CDMA ii) URL
iii) HTTP iv) WAN

Ans)

- (i) Code Divison Multiple Access
- (ii) Uniform Resource Locator (Location) / Universal Resource Locator (Location)
- (iii) Hype Text Transfer (Transmission) Protocol
- (iv) Wide Area Network

3) Write one advantage of STAR topology as compared to BUS topology 1m

Ans)

Fault detection is easy.
Fault isolation is easy.

4) UNIVERSITY OF CORRESPONDENCE in Allahabad is setting up the network between its different wings. There are 4 wings named as Science (S), Journalism (J), ARTS (A) and Home Science (H).

Distances between various wings are given below:

Wing A to Wing S	100 m
Wing A to Wing J	200 m
Wing A to Wing H	400 m
Wing S to Wing J	300 m
Wing S to Wing H	100 m
Wing J to Wing H	450 m

Number of Computers

Wing A	150
Wing S	10
Wing J	05
Wing H	50

i) Suggest a suitable Topology for networking the computer of all wings. 1m

Ans)

Star or Bus or any other valid topology or diagram.

ii) Name the wing where the Server to be installed. Justify your answer. 1m

Ans)

Wing A, because maximum number of computers are located at Wing A.

iii) Suggest the placement of Hub/Switch in the network. 1m

Ans)

Hub/Switch in all the wings.

OR

Correct diagram depicting placement of Hub/Switch in all the wings.

iv) Mention in economic technology to provide internet accessibility to all wings. 1m

Ans)

Coaxial cable / Modem / LAN / TCP-IP / Dialup/ DSL/ Leased Line

OR any other valid technology (any one).

OUTSIDE DELHI 2006:

1) Name two transmission media for networking. 1m

Ans)

Optical Fiber

Ethernet Cable or twisted pair cable or UTP or STP

Co-axial Cable

Infrared

Radio Link OR Radiowave

Microwave link OR Microwave

Satellite Link

2) Expand the following terms: 2m

i) XML ii) GSM

iii) SMS iv) MAN

Ans)

(i) XML Extensible Markup Language

(ii) GSM Global System for Mobile

(iii) SMS Short Messaging Service

{Message/Messaging both acceptable}

(iv) MAN Metropolitan Area Network

3) Difference between Hackers and Crackers? 1

Ans)

Hackers: Computer enthusiasts who enjoy learning about computer systems and get into other system/network for gaining more knowledge or may find flaws in the system for rectification purposes.

Crackers: Malicious programmers who break into secure systems for stealing and corrupting/spoiling data.

4) INDIAN PUBLIC SCHOOL in Darjeeling is setting up the network between its different wings. There are 4 wings named as SENIOR(S), JUNIORS (J), ADMIN (A) and HOSTEL (H).

Distance between various wings is given below:

Number of Computers

Wing A	10
Wing S	200

Wing J	100
Wing H	50

i) Suggest a suitable Topology for networking the computer of all wings. 1

Ans)

Star Topology

OR

Bus Topology

ii) Name the wing where the server to be installed. Justify your answer. 1m

Ans)

Wing S

as it has the maximum number of computers

OR

Wing A

as it is placed in the Admin Wing (for security reasons)

iii) Suggest the placement of Hub/Switch in the network. 1m

Ans)

Inside all the four wings

iv) Mention in economic technology to provide internet accessibility to all wings. 1m

Ans:

Any one of the following:

Dialup, TCP/IP, DSL, Modem, Broadband, Cable, ISDN, Telephone Line, Co-axial, Ethernet Cable, Radiowave

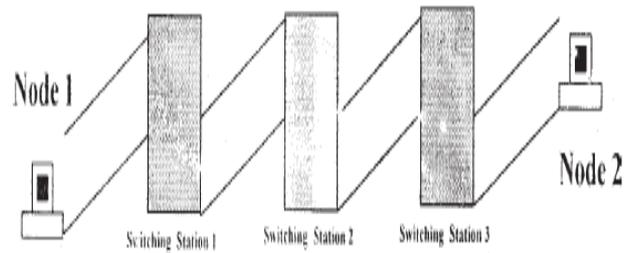
DELHI 2005:

1) What is the difference between Message Switching technique and Packet Switching technique? 1m

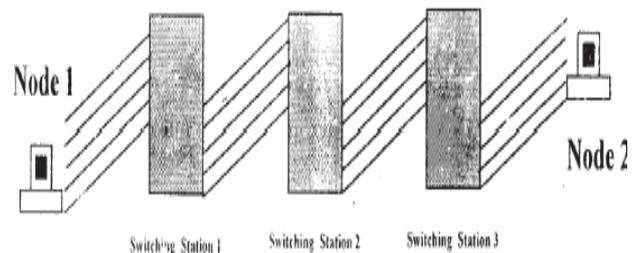
Ans)

Message switching: The source computer sends data (message) to the

switching office, which stores data in a buffer. It then looks for a free link to another switching office and sends data to that office. This process continues until data is delivered to the destination computer. This type of switching technique is also known as 'store and forward' switching.



Packet switching: A fixed size of packet that can be transmitted across the network is specified. All the packets are stored in the main memory instead of disk. As a result accessing time of packets is reduced.



2) Expand the following terminologies: 2m

- i) TCP/IP ii) XML
- iii) CDMA iv) WLL

Ans)

- (i) Transmission Control Protocol/Internet Protocol
- (ii) eXtensible Markup Language **OR** extendable Markup Language
- (iii) Code Division Multiple Access
- (iv) Wireless in a Local Loop

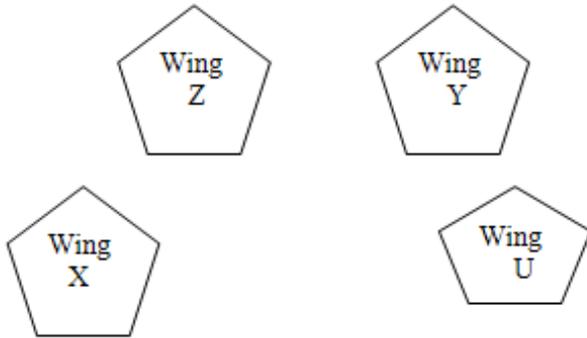
3) Write two application of Cyber Law. 1m

Ans)

Cyber law encompasses a wide variety of political and legal issues related to the Internet and other communications technology, including

intellectual property, privacy, freedom of expression, and jurisdiction.

4) The Great Brain Organization has set up its new Branch at Srinagar for its office and web based activities .It has 4 Wings of buildings as shown in the diagram:



Center to center distances between various blocks

Wing X to Wing Z	50 m
Wing Z to Wing Y	70 m
Wing Y to Wing X	125 m
Wing Y to Wing U	80 m
Wing X to Wing U	175 m
Wing Z to Wing U	90 m

Number of computers

Wing X	50
Wing Z	30
Wing Y	150
Wing U	15

1) Suggest a most suitable cable layout of connections between the Wings, and topology 1

Ans)

[½ Mark for drawing / mentioning any suitable cable layout]

[½ Mark for mentioning the topology]

2) Suggest the most suitable place (i.e., Wing)to house the server of this organization with a suitable reason, with justification. 1m

Ans) Wing Y as it has largest number of computers

3) Suggest the placement of the following devices with justification: 1

(i) Repeater (ii) Hub/Switch

Ans)

[½ Mark for mentioning Switch/Hub placement in each of the building]

[½ Mark for suggesting the placement of repeater for the distances higher than 70 m]

4) The organization is planning to link its head office situated in Delhi with the offices at Srinagar.1m Suggest an economic way to connect it; the company is ready to compromise on the speed of connectivity. Justify your answer.

Ans)

TCP/IP Dial Up (Most Suitable answer 1)

OR

Telephone Link (Most Suitable answer 2)

OR

Microwave

OR

Radio Link/Radio Wave

OR

Satellite Link

OR

WAN

OUT SIDE DELHI: 2005

1) Compare Optical Fiber and Coaxial transmission media. 1m

Ans)

Coaxial Cable: Comparatively Slow, Economic, convenient to lay down, used in Bus topology of networks;

Optical Fibre: Very fast, expensive, reliable, no interference

2) Expand the following terminologies:

i) HTML ii) GSM

Ans)

Hyper Text Markup Language

Global System for Mobile communication

3) What is the difference between XML and HTML? Write two differences. 1m

Ans)

eXtensible Markup Language:

It contains user defined tags

Hyper Text Markup Language:

It contains predefined tags

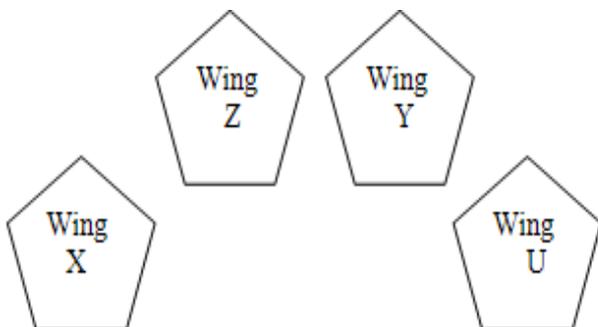
4) What do you understand by the terms Cookies and Firewall? 1m

Ans)

Cookies: A small piece of information that a server sends to a client When you visit a Web site with cookie capabilities, its server sends certain information about you to your browser, which is stored on your hard drive as a text file. At some later time (such as returning to the site the next day),the server retrieves the cookie. It's a way to the server to remember things about you.

Firewall: Any of a number of security schemes (hardware/software) that prevent unauthorized users from gaining access to a computer network or that monitor transfers of information to and from the network.

5) The Cyber Mind Organization has set up its new Branch at Mizoram for its office and web based activities. It has 4 Wings of buildings as shown in the diagram:



Center to center distances between various blocks

Wing X to Wing Z	40 m
Wing Z to Wing Y	60 m
Wing Y to Wing X	135 m
Wing Y to Wing U	70 m
Wing X to Wing U	165 m
Wing Z to Wing U	80 m

Number of computers

Wing X	50
Wing Z	130
Wing Y	40
Wing U	15

1) Suggest a most suitable cable layout of connections between the Wings, and topology 1m

2) Suggest the most suitable place (i.e., Wing) to house the server of this organization with a suitable reason, with justification. 1m

Ans)

Wing Z as it has largest number of computers

3) Suggest the placement of the following devices with justification: 1m
(i) Repeater (ii) Hub/Switch

4) The organization is planning to link its head office situated in Delhi with the offices at Srinagar. 1m Suggest an economic way to connect it; the company is ready to compromise on the speed of connectivity. Justify your answer. 2m

Ans)

TCP/IP Dial Up (Most Suitable answer 1)

OR

Telephone Link (Most Suitable answer 2)

OR

Microwave

OR

Radio Link/Radio Wave

OR

Satellite Link

OR

WAN

DELHI 2004:

1) Write two advantages and two disadvantages for STAR topology? 1m

2) Write one difference between Coaxial and optical cable? 1m

3) Explain the following terms in short. 2m

- i) FTP ii) URL

4) Define Packet switching? 1m

DELHI: 2003

1) What is the purpose of using a repeater in the context of networking? 1

2) Write an advantage and a disadvantage of using optical fibre cables? 1m

3) Write one advantage and one disadvantage of the following topologies in network: 2m

- i) STAR Topology
ii) BUS Topology

4) What is the difference between MAN and WAN? 1m

DELHI 2002:

1) What is a Modem? 1m

2) Write the following abbreviations in their full form. 1m

- i) FTP ii) WAN
iii) WWW

3) Mention one difference between circuit switching and packet switching. 2m

4) Write two advantages and disadvantages of the following topologies in a Network. 1m

- i) BUS ii) RING

DELHI 2001:

1) What is NFS? 1m

2) Mention one advantage of networking. 1m

3) Name two communication channels used in networking and explain any one. 2m

4) Mention one difference between Linear and Star topologies in networking. 1m

DELHI 2000:

1) What are Routers? 1m

2) What is the purpose of using a MODEM? 1

3) Write the two advantages and two disadvantages of BUS Topology in network? 2

4) What is the difference between LAN and WAN? 1m

DELHI 1999:

1) What is a bridge? 1m

2) What is the purpose of using FTP? 1

3) Give two advantages and disadvantages of following network topologies: 2m

- i) BUS ii) Tree

4) What is the difference between WAN and MAN. 1m

DELHI 1998:

1) What are repeaters? 1m

2) What is the difference between LAN and MAN? 1m

3) Describe the following in brief: 2m
i) MOSAIC ii) Usenet

4) What do you understand by a backbone network? 1m

MODEL PAPER 1 FOR 2009-10:

7.a) Compare any two Switching techniques. 1

Ans)

Appropriate comparison between any two out of Circuit Switching, Message Switching, Packet Switching

b) Which of the following is not a Client Side script: 1
(i) VB Script (ii) Java Script
(iii) ASP (iv) PHP

Ans)

(iii) ASP and (iv) PHP are not client side scripts

c) If someone has hacked your Website, to whom you lodge the Complain? 1

Ans)

The complaint has to be lodged with the Police under IT Act.

d) What do you mean by IP Address? How is it useful in Computer Security? 1

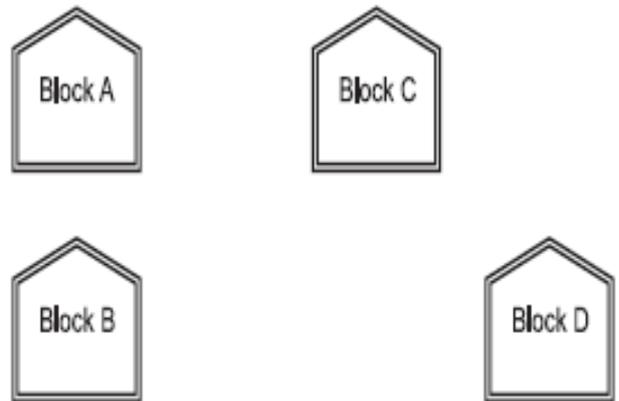
Ans)

An Internet Protocol (IP) address is a numerical identification and logical address that is assigned to devices connected in a computer network.

An IP Address is used to uniquely identify devices on the Internet and so one can

quickly know the location of the system in the network.

e) Knowledge Supplement Organisation has set up its new center at Mangalore for its office and web based activities. It has 4 blocks of buildings as shown in the diagram below: 4



Center to center distances between various blocks

Block A to Block B	50 m
Block B to Block C	150 m
Block C to Block D	25 m
Block A to Block D	170 m
Block B to Block D	125 m
Block A to Block C	90 m

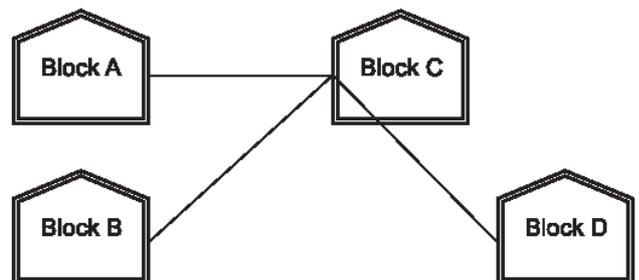
Number of Computers

Block A	25
Block B	50
Block C	125
Block D	10

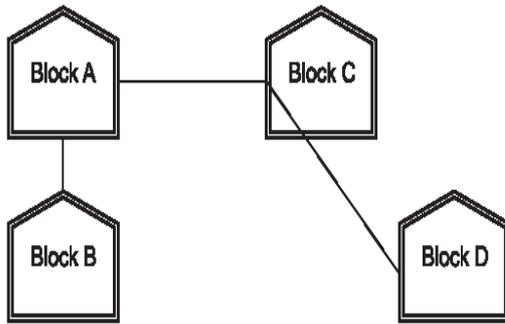
e1) Suggest a cable layout of connections between the blocks.

Ans)

Layout Option 1:



Layout Option 2: Since the distance between Block A and Block B is quite short



e2) Suggest the most suitable place (i.e. block) to house the server of this organization with a suitable reason.

Ans)

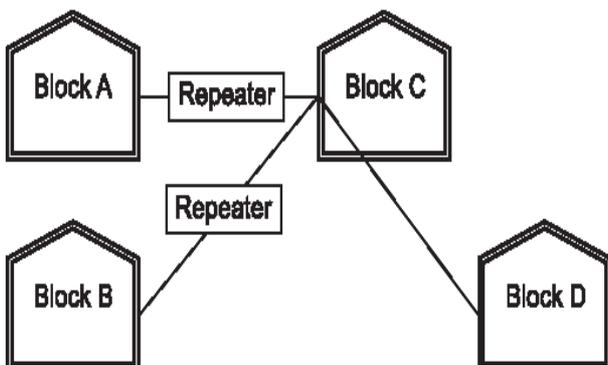
The most suitable place / block to house the server of this organisation would be Block C, as this block contains the maximum number of computers, thus decreasing the cabling cost for most of the computers as well as increasing the efficiency of the maximum computers in the network.

e3) Suggest the placement of the following devices with justification

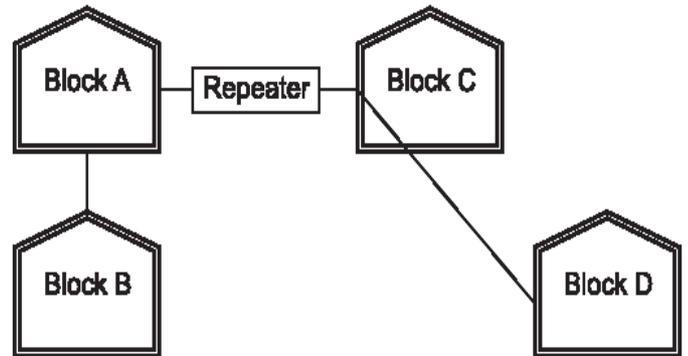
- (i) Repeater
- (ii) Hub/Switch

Ans)

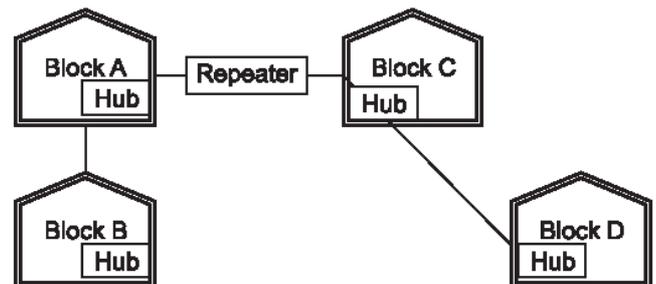
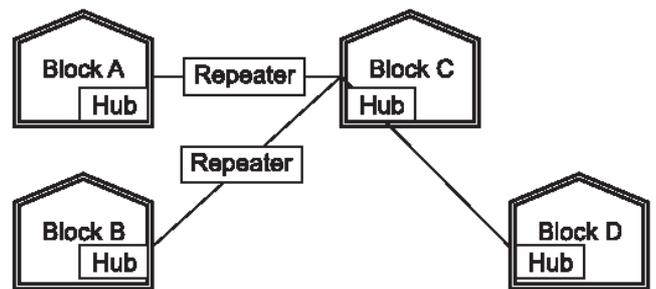
(i) For Layout 1, since the cabling distance between Blocks A and C, and that between B and C are quite large, so a repeater each, would ideally be needed along their path to avoid loss of signals during the course of data flow in these routes.



For layout 2, since the distance between Blocks A and C is large so a repeater would ideally be placed in between this path.



(ii) In both the layouts, a hub/switch each would be needed in all the blocks, to interconnect the group of cables from the different computers in each block.



e4) The organization is planning to link its front office situated in the city in a hilly region where cable connection is not feasible, suggest an economic way to connect it with reasonably high speed?

Ans)

The most economic way to connect it with a reasonable high speed would be

to use radio wave transmission, as they are easy to install, can travel long distances, and penetrate buildings easily, so they are widely used for communication, both indoors and outdoors. Radio waves also have the advantage of being omni directional, which is they can travel in all the directions from the source, so that the transmitter and receiver do not have to be carefully aligned physically.

f) What do you mean by Spam Mails? How can you protect your mailbox from Spams?

Ans)

Spam mails, also known as junk e-mail, is a subset of spam that involves nearly identical messages sent to numerous recipients by e-mail. We can protect our mailbox from spams by creating appropriate filters.

g) Mention any two advantages of Open Source Software over Proprietary Software.

Ans)

Open Source's proponents often claim that it offers significant benefits when compared to typical Proprietary Software. Proprietary Software typically favour visible features (giving marketing advantage) over harder-to measure qualities such as stability, security and similar less glamorous attributes. Open Source Software developers are evidently motivated by many factors but favouring features over quality is not noticeable amongst them. For many developers, peer review and acclaim is important, so it's likely that they will prefer to build software that is admired by their peers. Highly prized factors are clean design, reliability and maintainability, with adherence to standards and shared community values preeminent.

MODEL PAPER 2 FOR 2009-10:

7. a) Define the term Bandwidth. Give any one unit of Bandwidth. 1

Ans)

Bandwidth is referred to the volume of information per unit of time that a transmission medium (like an Internet connection) can handle.

OR

The amount of data that can be transmitted in a fixed amount of time is known as bandwidth.

For digital devices, the bandwidth is usually expressed in bits per second (bps) or bytes per second. For analog devices, the bandwidth is expressed in cycles per second, or Hertz (Hz).

b) When do you prefer XML over HTML and why? 1

Ans)

The first benefit of XML is that because you are writing your own markup language, you are not restricted to a limited set of tags defined by proprietary vendors.

Rather than waiting for standards bodies to adopt tag set enhancements (a process which can take quite some time), or for browser companies to adopt each other's standards (yeah right!), with XML, you can create your own set of tags at your own pace.

c) How firewall protect our Network? 1

Ans)

A **firewall** is a part of a computer system or network that is designed to block unauthorized access while permitting authorized communications. It is a device or set of devices configured to permit, deny, encrypt, decrypt, or proxy all (in and

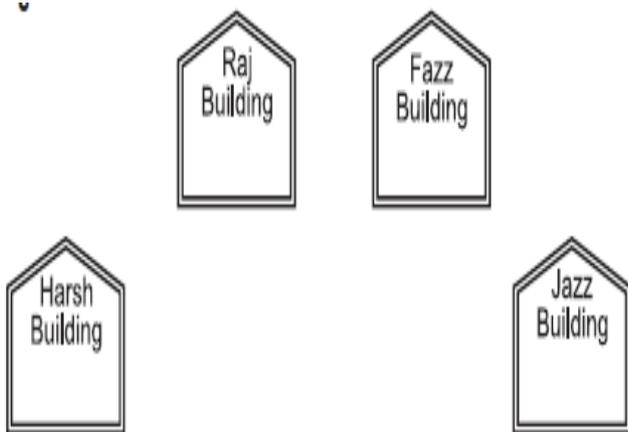
out) computer traffic between different security domains based upon a set of rules and other criteria.

d) What is the importance of URL in networking? 1

Ans)

A Uniform Resource Locator (URL) is used to specify, where an identified resource is available in the network and the mechanism for retrieving it. A URL is also referred to as a Web address.

e) Ravya Industries has set up its new center at Kaka Nagar for its office and web based activities. The company compound has 4 buildings as shown in the diagram below: 4



Center to center distances between various buildings is as follows:

Harsh Building to Raj Building	50 m
Raz Building to Fazz Building	60 m
Fazz Building to Jazz Building	25 m
Jazz Building to Harsh Building	170 m
Harsh Building to Fazz Building	125 m
Raj Building to Jazz Building	90 m

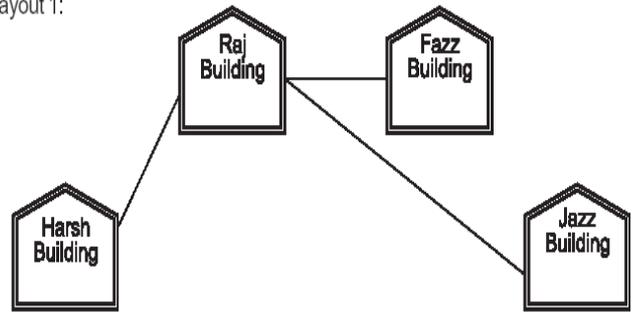
Number of Computers in each of the buildings is follows:

Harsh Building	15
Raj Building	150
Fazz Building	15
Jazz Building	25

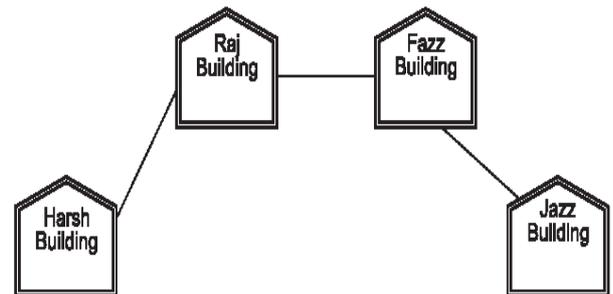
e1) Suggest a cable layout of connections between the buildings.

Ans)

Layout 1:



Layout 2: Since the distance between Fazz Building and Jazz Building is quite short



e2) Suggest the most suitable place (i.e. building) to house the server of this organization with a suitable reason.

Ans)

The most suitable place / block to house the server of this organisation would be Raj Building, as this block contains the maximum number of computers, thus decreasing the cabling cost for most of the computers as well as increasing the efficiency of the maximum computers in the network.

e3) Suggest the placement of the following devices with justification:

- (i) Internet Connecting Device/Modem
- (ii) Switch

Ans)

- (i) Raj Building
- (ii) 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 block

e4) The organisation is planning to link its sale counter situated in various parts of the same city, which type of network out of LAN, MAN or WAN will be formed? Justify your answer.

Ans)

The type of network that shall be formed to link the sale counters situated in various parts of the same city would be a MAN, because MAN (Metropolitan Area Networks) are the networks that link computer facilities within a city.

f) Compare freeware and Shareware. 1

Ans)

Freeware, the name derived from words "free" and "software". It is a computer software that is available for use at no cost or for an optional fee. Freeware is generally proprietary software available at zero price, and is not free software. The author usually restricts one or more rights to copy, distribute, and make derivative works of the software.

Shareware is usually offered as a trial version with certain features only available after the license is purchased, or as a full version, but for a trial period. Once the trial period has passed the program may stop running until a license is purchased. Shareware is often offered without support, updates, or help menus, which only become available with the purchase of a license. The words "free trial" or "trial version" are indicative of shareware.

g) How Trojan Horses are different from Worms? Mention any one difference. 1

Ans)

A Trojan horse is a term used to describe malware that appears, to the user, to perform a desirable function but, in fact, facilitates unauthorized access to the user's computer system. A computer worm is a self-replicating computer program. It uses a network to send copies of itself to other nodes (computers on the network) and it may do so without any user intervention.

MODEL PAPER 1 FOR 2008-09:

7.a) What is the significance of ARPANET in the network? 1

Ans)

The first evolution of network was jointly designed by The Advanced Research Projects Agency (ARPA) and Department of Defence (DoD) in 1969 and was called ARPANET. It was an experimental project, which connected a few computers of some of the reputed universities of USA and DoD. ARPANET allowed access and use of computer resource sharing projects. Later Defence Data Network (DDN) was born in 1983.

b) Expand the following terminologies: 1
(i) CDMA (ii) GSM

Ans)

Code Division Multiple Access
Global System for Mobile Communication

c) Give two major reasons to have network security. 1

Ans)

Two major reasons to have Network Security are
(i) **Secrecy:** Keeping information out of the reach of unauthorized users.

(ii) **Authentication:** Determining the authorized user before sharing sensitive information with or entering into a business deal.

d) What is the purpose of using a Web Browser? Name any one commonly used Web Browser. 1

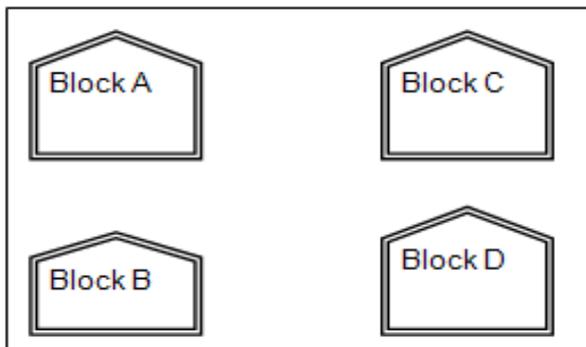
Ans)

The **Web Browser** fetches the page requested, interprets the text and formatting commands that it contains, and displays the page properly formatted on the screen.

Example of a Web Browser:

Mozilla Firefox OR Internet Explorer OR Netscape Navigator OR Safari OR OPERA

e) Knowledge Supplement Organisation has set up its new center at Mangalore for its office and web based activities. It has 4 blocks of buildings as shown in the diagram below:



Center to center distances between various blocks

Block A to Block B	50 m
Block B to Block C	150 m
Block C to Block D	25 m
Block A to Block D	170 m
Block B to Block D	125 m
Block A to Block C	90 m

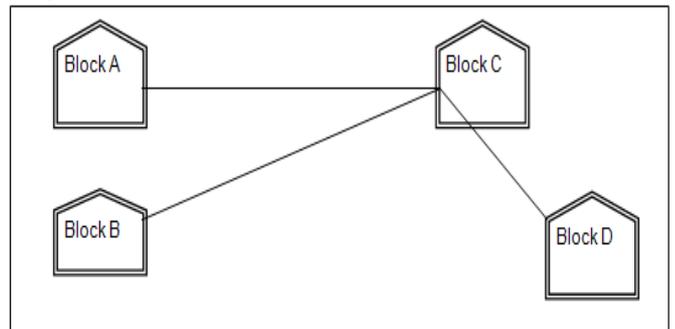
Number of Computers

Block A	25
Block B	50
Block C	125
Block D	10

e1) Suggest a cable layout of connections between the blocks. 1

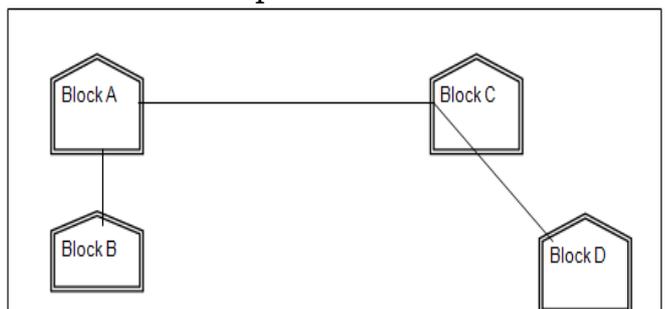
Ans)

Layout 1:



Layout Option 2:

Since the distance between Block A and Block B is quite short



e2) Suggest the most suitable place (i.e. block) to house the server of this organisation with a suitable reason. 1

Ans)

The most suitable place / block to house the server of this organisation would be Block C, as this block contains the maximum number of

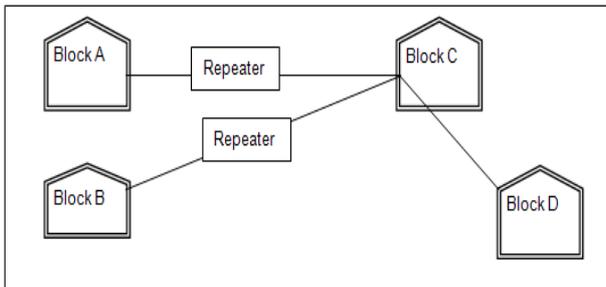
computers, thus decreasing the cabling cost for most of the computers as well as increasing the efficiency of the maximum computers in the network.

e3) Suggest the placement of the following devices with justification 1

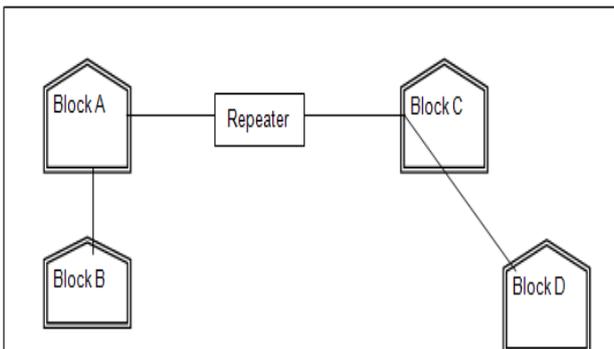
- i) Repeater
- ii) Hub/Switch

Ans)

For Layout 1, since the cabling distance between Blocks A and C, and that between B and C are quite large, so a repeater each, would ideally be needed along their path to avoid loss of signals during the course of data flow in these routes

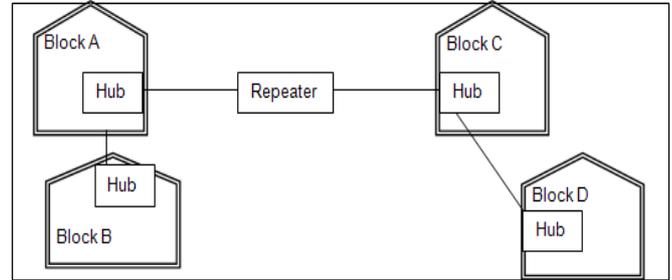
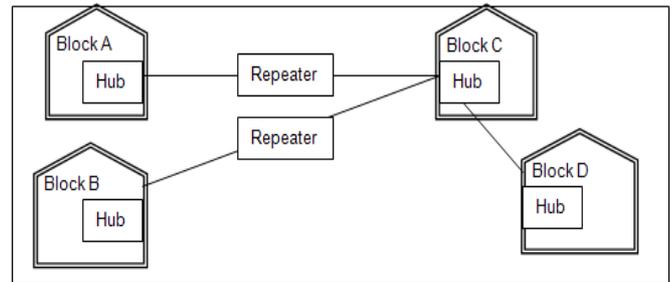


For layout 2, since the distance between Blocks A and C is large so a repeater would ideally be placed in between this path



In both the layouts, a hub/switch each would be needed in all the blocks, to interconnect the group of cables from the different computers in each block

Layout 1



e4) The organization is planning to link its front office situated in the city in a hilly region where cable connection is not feasible, suggest an economic way to connect it with reasonably high speed? 1

Ans)

The most economic way to connect it with a reasonable high speed would be to use radio wave transmission, as they are easy to install, can travel long distances, and penetrate buildings easily, so they are widely used for communication, both indoors and outdoors. Radio waves also have the advantage of being omni directional, which is they can travel in all the directions from the source, so that the transmitter and receiver do not have to be carefully aligned physically.

MODEL PAPER 2 FOR 2008-09:

7.a) Define the term Bandwidth. Give unit of Bandwidth. 1

Ans)

Bandwidth is the capability of a medium to transmit an amount of information over a distance. Bandwidth of a medium is generally measured in bits per second (bps) or

more commonly in kilobits per second (kbps)

b) Expand the following terminologies: 1
(i) HTML (ii) XML

Ans)

Hypertext Markup Language
Extended Markup Language

c) Define the term firewall. 1

Ans)

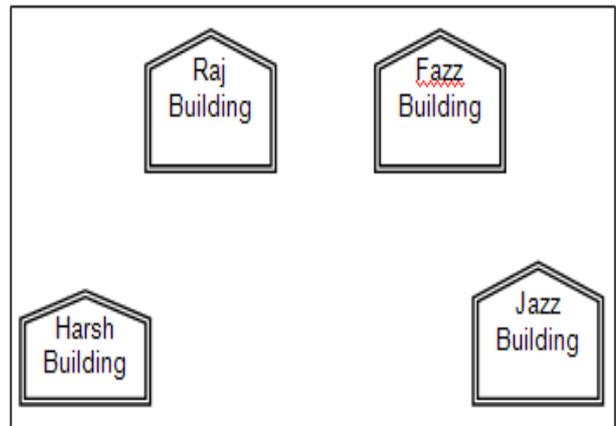
Firewall is a feature used for Network Security. In a Network there is always danger of information leaking out or leaking in. Firewall is a feature which forces all information entering or leaving the network to pass through a check to make sure that there is no unauthorized usage of the network.

d) What is the importance of URL in networking? 1

Ans)

URL stands for Uniform Resource Locator. Each page that is created for Web browsing is assigned a URL that effectively serves as the page's worldwide name or address. URL's have three parts: the protocol, the DNS name of the machine on which the page is located and a local name uniquely indicating the specific page (generally the filename).

e) Ravya Industries has set up its new center at Kaka Nagar for its office and web based activities. The company compound has 4 buildings as shown in the diagram below:



Center to center distances between various buildings is as follows:

Harsh Building to Raj Building	50 m
Raj Building to Fazz Building	60 m
Fazz Building to Jazz Building	25 m
Jazz Building to Harsh Building	170 m
Harsh Building to Fazz Building	125 m
Raj Building to Jazz Building	90 m

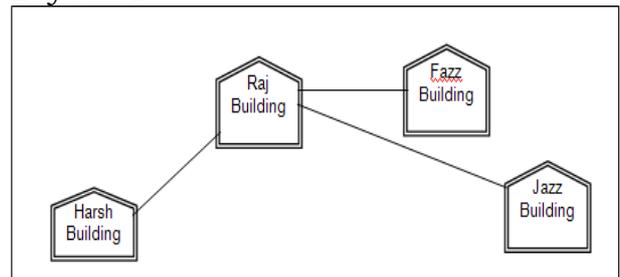
Number of Computers in each of the buildings is follows:

Harsh Building	15
Raj Building	150
Fazz Building	15
Jazz Building	25

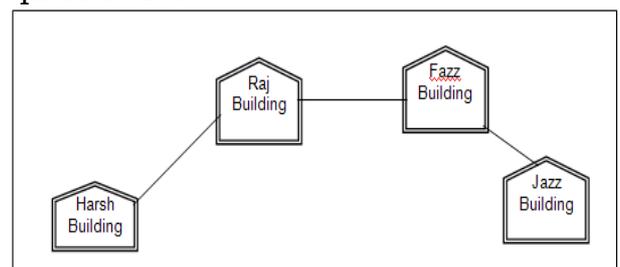
e1) Suggest a cable layout of connections between the buildings. 1

Ans)

Layout 1:



Layout 2: Since the distance between Fazz Building and Jazz Building is quite short



e2) Suggest the most suitable place (i.e. building) to house the server of

this organisation with a suitable reason. 1

Ans)

The most suitable place / block to house the server of this organisation would be Raj Building, as this block contains the maximum number of computers, thus decreasing the cabling cost for most of the computers as well as increasing the efficiency of the maximum computers in the network.

e3) Suggest the placement of the following devices with justification:1

- i)Internet Connecting Device/Modem
- ii)Switch

Ans)

(i)Raj Building
(ii)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 block

e4) The organisation is planning to link its sale counter situated in various parts of the same city, which type of network out of LAN, MAN or WAN will be formed? Justify your answer. 1

Ans)

The type of network that shall be formed to link the sale counters situated in various parts of the same city would be a MAN, because MAN (Metropolitan Area Networks) are the networks that link computer facilities within a city.

NETWORKS

FULL FORMS

TCP/IP – Transmission Control Protocol /

Internet Protocol

LAN – Local Area Network

MAN – Metropolitan Area Network

WAN – Wide Area Network

Modem –

Modulation(tor)/Demodulation(tor)

URL – Uniform Resource Location

FTP – File Transfer Protocol

HTTP – Hyper Text Transfer Protocol

PPP – Point to Point Protocol

GSM – Global System for Mobile

CDMA – Code Division Multiple Access

WLL(WiLL)–Wireless in Local Loop

SMS – Short Message Service

WWW – World Wide Web

HTML – Hyper Text Markup Language

XML – eXtensible Markup Language

NFS – Network File System

ARPANET – Advanced Research Projects Agency

NSFnet – National Science Foundation

NIU – Network Interface Unit

NIC - Network Interface Card

TAP – Terminal Access Point
(NIU = NIC = TAP)

VGM – Voice Grade Medium

DGM – Data Grade Medium

STP – Shielded Twisted Pair

UTP – Unshielded Twisted Pair

LED – Light Emitting Diode

LD – Laser Diode

Kbps – Kilo bits Per Second

KBps – Kilo Bytes Per Second

Mbps – Mega Bits Per Second

MBps – Mega Bytes Per Second

Gbps – Giga Bits Per Second

GBps – Giga Bytes Per Second

OFC – Optic Fiber Cable, Fiber Optic Cable

KHz – Kilo Hertz

MHz – Mega Hertz

GHz – Giga Hertz
 THz – Tera Hertz
 Bps – Bytes Per Second
 bps – Bits Per Second
 PDA – Personal Digital Assistants
 P-P – Point to Point
 AM – Amplitude Modulation
 FM – Frequency Modulation
 PM – Phase Modulation
 A/F – Audio Frequency
 (Txd – Transmit, Rxd – Receive, RTS – Request to Send
 CD – Carrier Detect, DSR – Data Set Ready, CTS – Clear to Send
 DTR – Data Terminal Ready)
 RJ45 – Registered Jack – 45
 BNC – Bayone – Neill – Concelman
 AUI – Attachment Unit Interface
 SNA – Systems Network Architecture
 VFIR – Very Fast Infrared
 URI – Uniform Resource Identifier
 URN – Uniform Resource Name
 MIME – Mail and Multipurpose Internet Mail Extensions
 POP – Post Office Protocol
 SMTP – Simple Mail Transfer Protocol
 NNTP – Network News Transfer Protocol
 HTTP – Hyper Text Transfer Protocol
 NTP – Network Time Protocol
 IMAP – Internet Mail Transfer Protocol
 SLIP – Serial Line Internet Protocol
 IPCP – IP Control Protocol
 NCP – Network Control Protocol
 LCP – Link Control Protocol
 PC – Personal Computer
 ISP – Internet Service Provider
SIM – Subscriber Identity Module
TDMA – Time Division Multiple Access
 TDM – Time Division Multiplexing
 IDEN – Integrated Digital Enhanced Network
 WCDMA – Wideband CDMA
 PSTN – Public Switched Telephone Network

3G – Third Generation
 UMTS – Universal Mobile Telecommunications System / Universal Mobile Telephone System
 EDGE – Enhanced Data rates for Global Evolution
 SMSC – Short Message Service Center
 HLR – Home Location Register
 Email – Electronic Mail
 Fax – Fascimile
 VSNL – Videsh Sanchar Nigam Limited
DNS – Domain Name Server
 DHTML – Dynamic Hyper Text Markup Language
 DECnet – Digital's family of communication protocols
 IE – Internet Explorer

***ALL THE BEST *
 FROM
 Mr.&Mrs.
 M.RAVI KIRAN**

***“THE FEAR OF THE LORD IS THE
 BEGINNING OF WISDOM”***