# Question 1

a)

| A | B | F |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

B)

| X | 0 | F |
|---|---|---|
| 1 | 0 | 1 |
| 0 | 0 | 0 |

b)

| x | X' | (x')' |
|---|----|-------|
| 0 | 1  | 0     |
| 1 | 0  | 1     |

c)

| x | y | z | (x+y)+z | x+(y+z) |
|---|---|---|---------|---------|
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 1 | 1 |
| 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |

A)

# Question 2

a)

(A+B)

D=[(A+B)+C]

b)

(F.G) ——▶ [(FG) (H)]——▶I={ FGH}

c)

(D'+E) ——▶ [(D'+E)+F]

d)

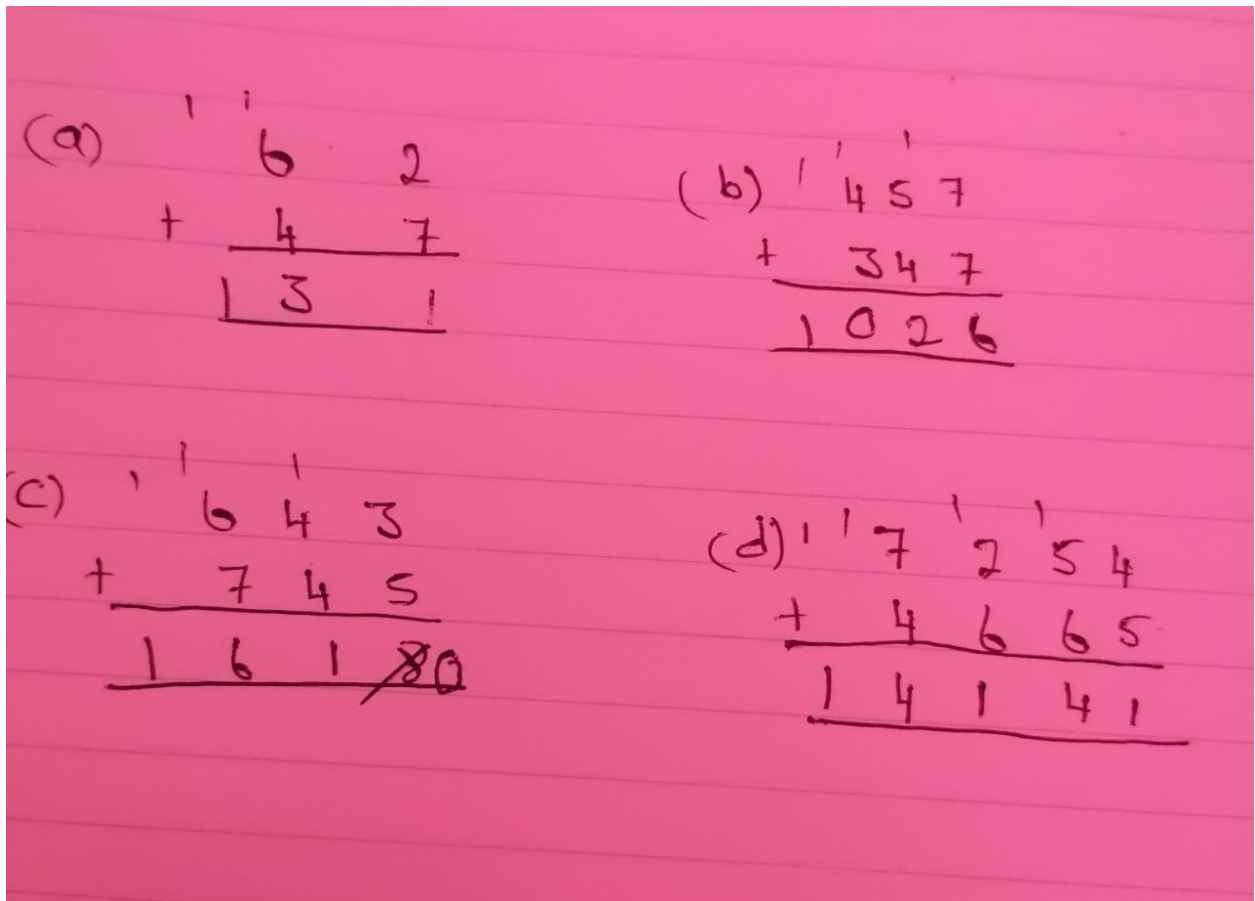T= (R+S' + R'+S)
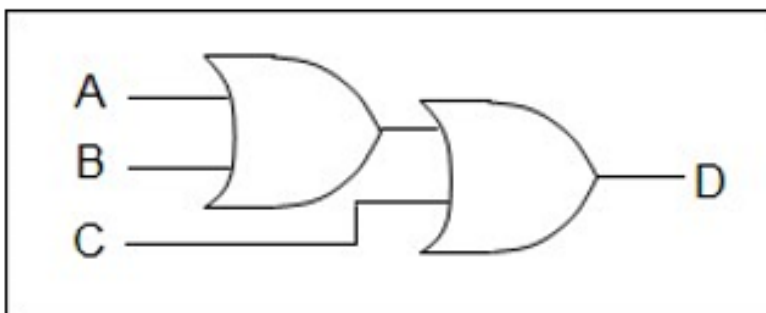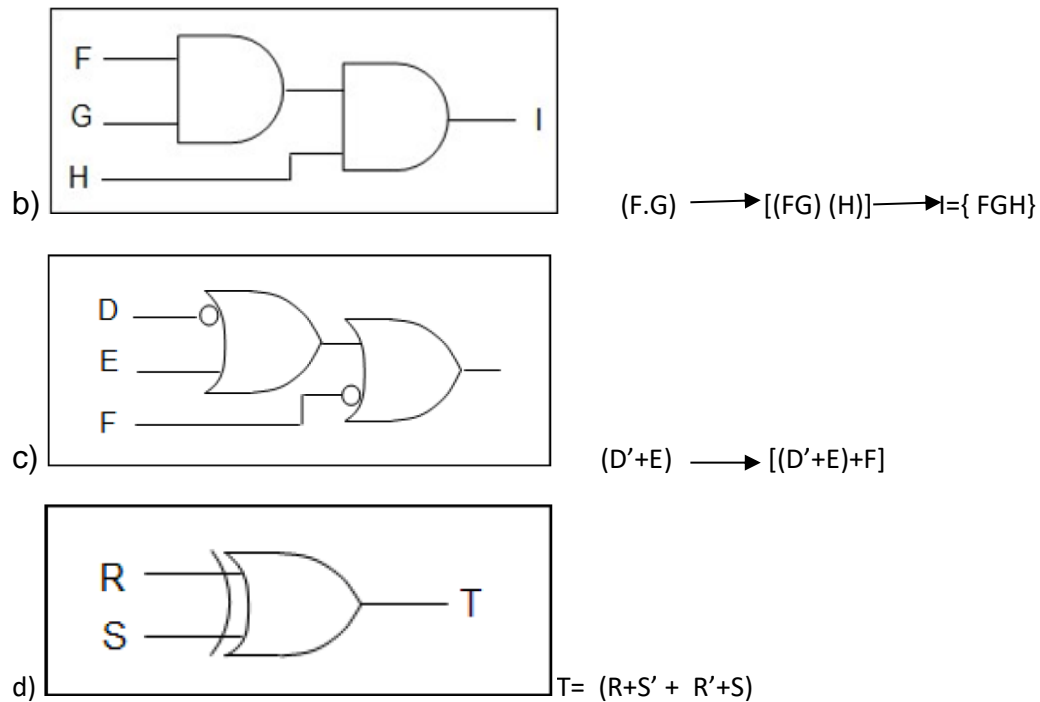
## QUESTION 4

a) Overflow is when the number of bits (or data) exceeds the storage capacity of a computer's memory .

b) An overflow is handled through taking it (digit )and adding it back to the right most digit (for example if the digit is one , you take it from the front and add it to the last digit (rightmost digit) of your bits)

C)

a)  62+47  =131

(a)
$$
\begin{array}{r}
\phantom{+}\ ^{1}\ 6\ \ ^{i}2 \\
+\ \ 4\ \ 7 \\
\hline
1\ 3\ \ ! \\
\end{array}
$$

(b)
$$
\begin{array}{r}
\phantom{+}\ ^{1}4\ ^{1}5\ 7 \\
+\ \ 3\ 4\ 7 \\
\hline
1\ 0\ 2\ 6 \\
\end{array}
$$

(c)
$$
\begin{array}{r}
\phantom{+}\ ^{1}6\ ^{i}4\ 3 \\
+\ \ 7\ 4\ 5 \\
\hline
1\ 6\ 1\ 8\!\!\!/\,0 \\
\end{array}
$$

(d)
$$
\begin{array}{r}
\ ^{1}\ ^{1}7\ ^{1}2\ ^{1}5\ 4 \\
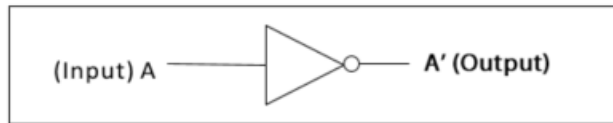+\ \ 4\ 6\ 6\ 5 \\
\hline
1\ 4\ 1\ 4\ 1 \\
\end{array}
$$

b)457+347=1026

c)643+745=16180

d) 7254+4665=141441

## Question 5



a)



b)

(Input) A ———▷o— A' (Output)

c)

1

d)

x
⟍⟍⟍▷o F
y

e)

x ⟍⟍▷ F
y

f)

A ⟍⟍⟍▷o F
B

g)

# Question6

A ⟍⟍▷ A:
B

C ⟍⟍▷ B:

D ⟍⟍▷ C:
E

D:

F E:

4th level    3rd level    2nd level   1st level
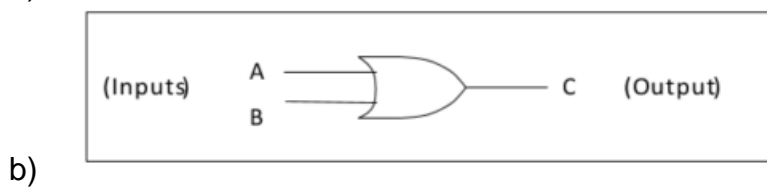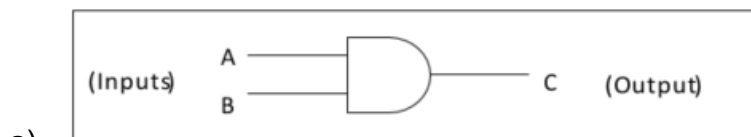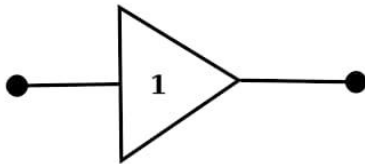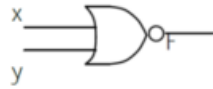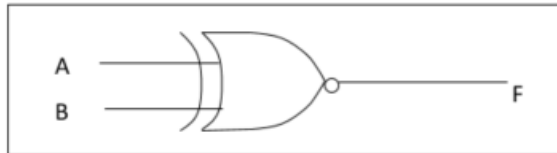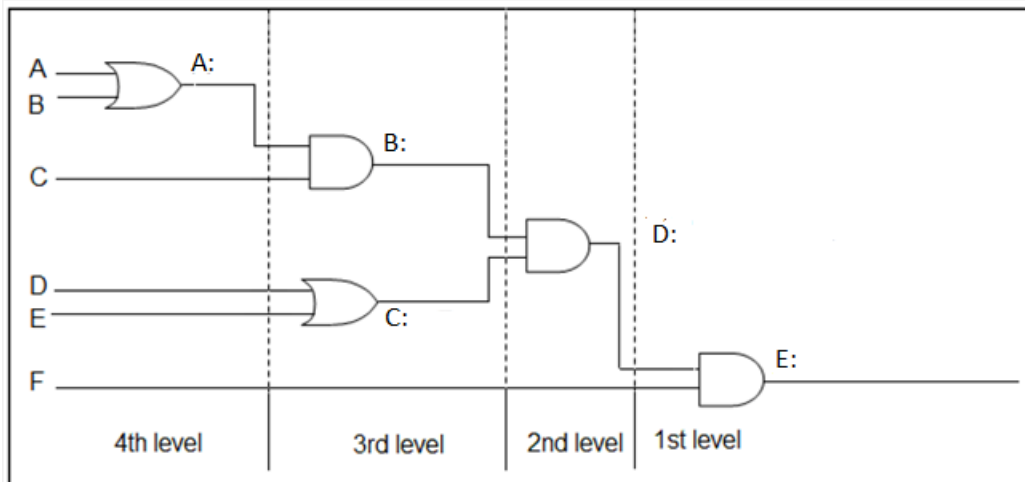
A:(A+B)

B:(C) (A+B)

C:(D+E)

D:(C)(A+B)(D+E)

E:(C)(A+B)(D+E)(F)

# Question 7

a)  F = (ab)(cd')(a')

   =(a a') (b c) (d')

   =0

b)  F = xzy +xzy' +x'z

   =x (zy+zy') +x'z

   =x(z(y+y') +x'z

   =x(z(1))+x'z

   =xz+x'z

   =z(x+x')

   =z

c)  F = ab'c + ac'(b + a') + a'b'c

   =ab'c +ac'b +ac'a' + a'b'c

   =ab'c +c'(ab+aa')+a'b'c

   =ab'c +c'ab +a'b'c

   =c(ab'+a'b')+c'ab

   =c(b'(a+a'))+c'ab

   =cb'+c'ab

d)  F = xwy' + z'yxw + wxyz + yx'zw

   =w(xy'+z'yx+xyz+yx'z)

   =w(x(y'+z'y+yz)+yx'z)

   =w(x(y')(y(z'+z))+yx'z)

   =w(yx'z)

   =wyx'z

e)  F = AB'C + AB'C' + ABC' + ABC + A

   =A(B'C+B'C'+BC'+BC+1)

   =A(B'(C+C')+B(C'+C)+1)

   =A(B'(1)+B(1)+1)

   =A

# Question 8

a) F = ABC + AB'C + AB'C'

| A | B | C | B' | C' | ABC | AB'C | AB'C' | F |
|---|---|---|----|----|-----|------|-------|---|
| 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 |

ABC+AB'C+AB'C'

=A(BC+B'C+B'C')

=A(BC+B'(C+C'))

=A(BC+B'(1))

=A(BC+B')

=ABC+AB'

AB

|  | 00 | 01 | 10 | 11 |
|---|---|---|---|---|
| C 0 | 0 | 0 | 1 | 0 |
| 1 | 0 | 0 | 0 | 0 |

b) F = A'B'C + A'BC + ABC' + ABC

| A | B | C | A' | B' | C' | A'B'C | A'BC | ABC' | ABC | F |
|---|---|---|----|----|----|-------|------|------|-----|---|
| 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 |
| 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |

AB

|     | 00 | 01 | 10 | 11 |
|-----|----|----|----|----|
| C 0 | 0  | 0  | 0  | 1  |
| 1   | 1  | 1  | 0  | 1  |

$F = A'B'C + A'BC + ABC' + ABC$

$=C(A'B'+A'B+AB)+ABC'$

$=C(A'(B'+B)+AB)+ABC'$

$=C(A'+AB)+ABC$

$=CA'+CAB+ABC'$

$=CA'+AB(C+C')$

$=CA'+AB$

QUESTION9

| LADY'S CLOTHES OPTIONS | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C1 | Red dress | Y | Y | Y | Y | Y | Y | Y | Y | N | N | N | N | N | N | N | N |
| C2 | A cap | Y | Y | Y | Y | N | N | N | N | Y | Y | Y | Y | N | N | N | N |
| C3 | A shirt | Y | Y | N | N | Y | Y | N | N | Y | Y | N | N | Y | Y | N | N |
| C4 | Mini skirt | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N | Y | N |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| A1 | Shirt | X |  |  |  | X |  |  |  | X |  |  |  | X |  |  |  |
| A2 | mini skirt | X |  |  |  | X |  |  |  | X |  |  |  | X |  |  |  |
| A3 | Pair of shoes |  |  |  | X |  | X | X | X |  | X | X | X | X | X | X | X |
| A4 | Two pairs of shoes | X | X | X |  | X |  |  |  | X |  |  |  |  |  |  |  |

# Question 10

```
                    ┌─────────────┐
                    │    start    │
                    └──────┬──────┘
                           │
                           ▼
              ╱─────────────────────╲
             ╱     Name=aaa          ╱ ◄─────────────┐
            ╱─────────────┬─────────╱                │
                          │                          │
                          ▼                          │
              ╱─────────────────────╲                │
             ╱   Age=21<X<35          ╱               │
            ╱─────────────┬─────────╱                 │
                          │                          │
                          ▼                          │
              ╱─────────────────────╲                │
             ╱   Height=>170cm       ╱               │
            ╱─────────────┬─────────╱                 │
                          │                          │
                          ▼                          │
              ╱─────────────────────╲                │
             ╱   Weight=>60kg        ╱               │
            ╱─────────────┬─────────╱                 │
                          │                          │
                          ▼                          │
                  ╱───────────╲     yes     ┌────────────────┐
                 ╱  Name=<zzz   ╲ ─────────► │   Printname    │
                  ╲             ╱            └────────────────┘
                   ╲───────────╱
                          │ no
                          ▼
                  ╭─────────────╮
                  │    stop     │
                  ╰─────────────╯
```

REFRENCING

https://youtu.be/RO5alU6PpSU

https://youtu.be/JQBRzsPhw2w
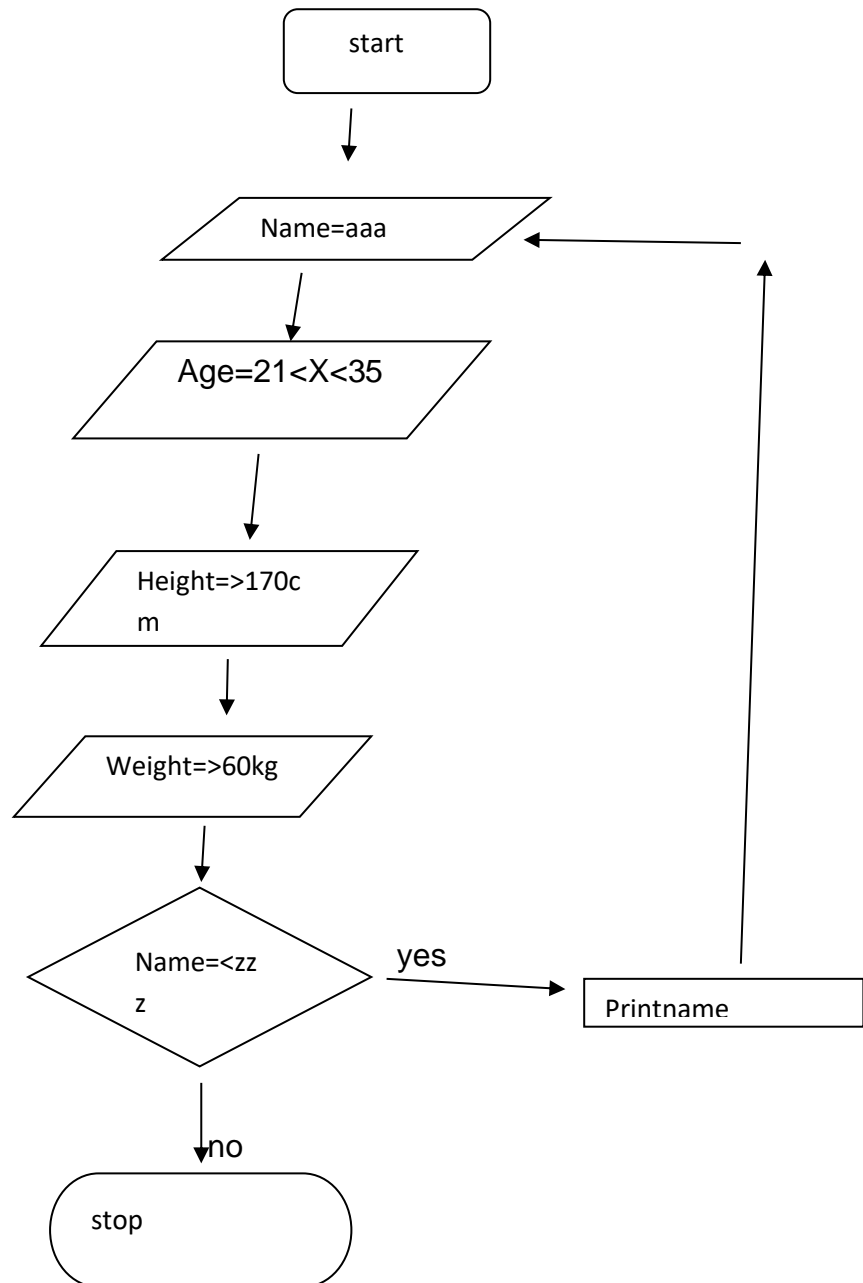
3 Karnaugh Maps –
Introduction.mp4

Boolean Algebra 2 –
Simplifying Complex E...

Boolean Algebra 1 –
The Laws of Boolean ...

5 Truth Table to
Boolean Expression.m...

4 Karnaugh Maps -
Example 1.mp4

3 Karnaugh Maps –
Introduction.mp4

Boolean Expression
Represented as a Tru...

PRFU_Programming
Fundamentals-Process...