PNS SCHOOL OF ENGINEERING AND TECHNOLOGY

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DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING

1ST INTERNAL ASSESSMENT EXAM QUSTIONS & ANSWER

SUB- DIGITAL ELECTRONICS AND MICROPROCESSOR (TH-3)

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Internal Assessment Examination-2022(5th Semester)

Subject : Th-3 -Digital Electronics & Microprocessor

Branch : Electrical Engineering

Time : $1\frac{1}{2}$ Hours F.M. : 20

1. Answer all questions [2 x 5]

(a) What do you mean Radix of a no system ?

(b) Convert $(475)_{10}$ into $(\_\_\_\_\_)_2$?

(c) Find XS-3 Code of 897.

(d) Define Don't Care Condition.

(e) Draw the gate symbol and truth table of 3 input NOR gate.

2. Answer any two questions. [5 x 2]

(a) State and prove De-Morgan's Theorem.

(b) Explain the working principle of full substractor with Truth Table and Logic Diagram.

(c) Solve by K-map :

$F(A,B,C,D) = \Sigma m(0,5,6,15) + d(2,3,7,10,11,13)$

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1- (a) Radix ÷

The number of digits used in a number system , is called radix of the number system.

For eg; binary number system only 0 and 1 are used . so radix is 2.

(b) $(478)_{10}$;

2	475	
2	237	- 1
2	118	- 1
2	59	- 0
2	29	- 1
2	14	- 1
2	7	- 0
2	3	- 1
2	1	- 1
	0	- 1

$=(1110111O11)_2$ (ANS)

(c)XS-3 code of 897= 8 9 7

+3 3 3

11 12 10

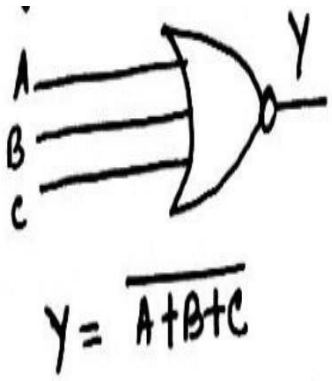
=(1011 1100 1010) (Ans)

(d) Don't care condition ÷

The combinations which are never occur in the outputs, is known as don't care condition.

For eg; in decimal no. system (10-15) are don't care conditions.

(e) 3 input NOR gate ÷



Truth table ÷

Input			Output
A	B	C	Y
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

2-(a) Demorgan's Theorem ÷

(I) $\overline{X+Y} = \overline{X} . \overline{Y}$

(II) $\overline{X.Y} = \overline{X} + \overline{Y}$

Where x , y are two logic variables

proof

(i) $\overline{X+Y} = \overline{X} . \overline{Y}$

Truth table ÷

X	Y	X+Y	$\overline{X+Y}$	$\overline{X}$	$\overline{Y}$	$\overline{X}.\overline{Y}$
0	0	0	1	1	1	1
0	1	1	0	1	0	0
1	0	1	0	0	1	0
1	1	1	O	0	0	0

From truth table $\overline{X+Y} = \overline{X}.\overline{Y}$

(ii) $\overline{X.Y} = \overline{X}+\overline{Y}$

Truth table ÷

X	Y	X.Y	$\overline{X.Y}$	$\overline{X}$	$\overline{Y}$	$\overline{X}+\overline{y}$
0	0	0	1	1	1	1
0	1	0	1	1	0	1
1	0	0	1	0	1	1
1	1	1	0	0	0	0

From truth table, $\overline{X.Y} = \overline{X} + \overline{Y}$ (Proved)

2- (b) Full subtractor ÷

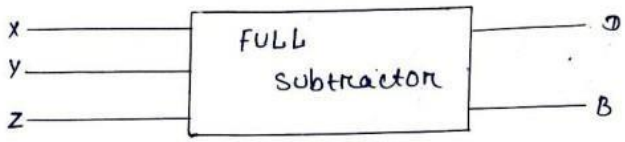
It is a combinational logic circuit which performs the arithmetic Substraction of 3 binary bits.

Here no of input =3 i.e x, y, z; and no of outputs =2i.e D and B

Where

D = difference

B = borrow

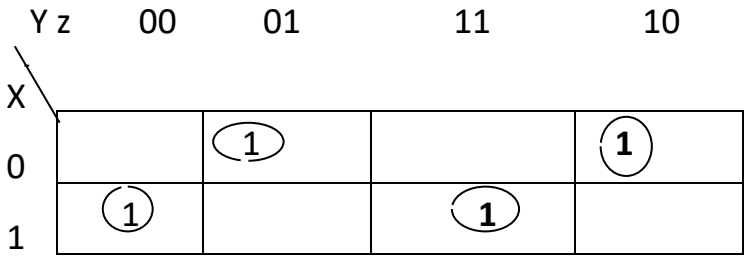


<BD of a full subtractor>

Truth table÷

Inputs			outputs	
X	Y	Y	D	B
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

Expression for D÷



D= $\overline{x}\,\overline{y}\,z + \overline{x}\,y\,\overline{z} + x\,\overline{y}\,\overline{z} + x\,y\,z$

= $\overline{x}\,(\overline{y}\,z + y\,\overline{z}) + x\,(\overline{y}\,\overline{z} + y\,z)$

Let A = $\overline{y}\,z + y\,\overline{z}$

$\overline{A} = \overline{y}\,\overline{z} + y\,z$

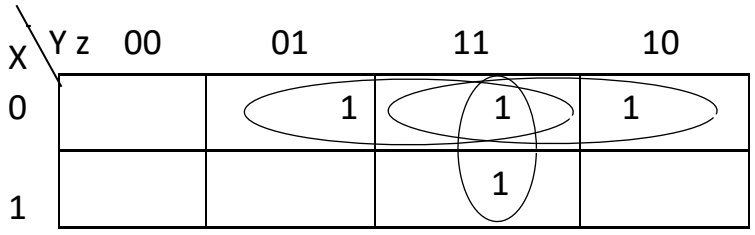
D = $\overline{X}\,A + X\,A$

= $X \oplus A$

= $X \oplus (\overline{y}\,Z + y\,\overline{Z})$

= $x \oplus y \oplus z$

Expression for B÷

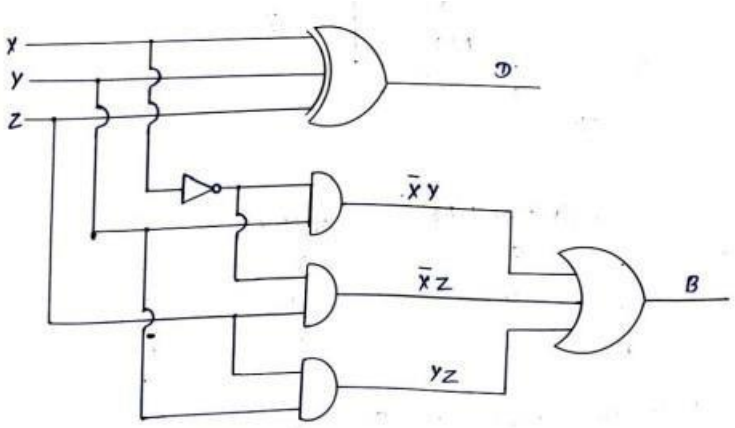


B= $\overline{x}\,z + \overline{x}\,y + y\,z$

Logic diagram of full subtracter ÷

D= $x \oplus y \oplus z$

B= $\overline{x}\, y + \overline{x}\, z + y z$



2 (c) solve by k-map

F(A, B, C, D) = $\sum$ m(5, 0, 6, 15)+d(2, 3, 7, 10, 11 13)

AB \ CD	00	01	11	10
00	1		x	x
01		1	x	1
11		x	1	
10			x	x

F=BD+ $\overline{A}\, C$ + $\overline{A}\ \overline{B}\ \overline{D}$