Discrete Math Reg:2019831055

Ans: 1

(a) $xyz + x\bar{y}\bar{z} + \bar{x}y\bar{z} + \bar{x}\bar{y}z$

let,

$A = xyz + x\bar{y}\bar{z} + \bar{x}y\bar{z} + \bar{x}\bar{y}z$

$= x(yz + \bar{y}\bar{z}) + \bar{x}(y\bar{z} + \bar{y}z)$

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

let, $x = a$, $y \oplus z = b$

so, $A = a\bar{b} + \bar{a}b$

$= a \oplus b$

$= x \oplus y \oplus z$

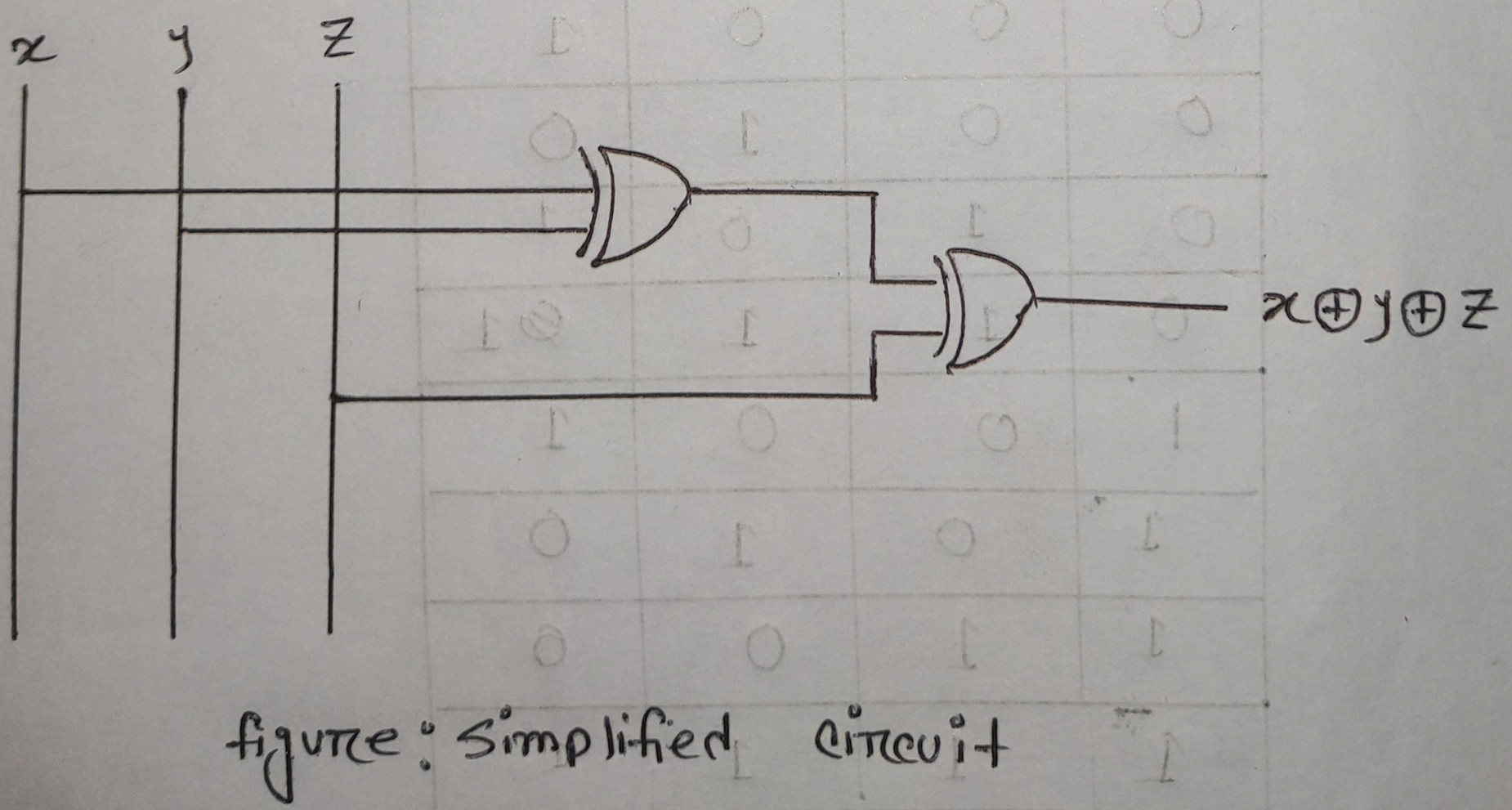

figure: Simplified circuit

Ans: 2

	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	1	0	1	1
$\bar{A}B$	1	0	0	1
AB	0	0	0	0
$A\bar{B}$	1	0	1	1

let, the expression is x

So, the minimum expression is,

$$x = \bar{A}\bar{D} + \bar{B}C + \bar{B}\bar{D}$$

Ans: 3:

A	B	C	x
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

$$X = \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}BC + A\bar{B}\bar{C} + AB\bar{C}$$

$$= \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + \bar{A}BC + A\bar{B}\bar{C} + ABC + \bar{A}\bar{B}\bar{C}$$

$$= \bar{A}\bar{C}(\bar{B}+B) + BC(\bar{A}+A) + \bar{B}\bar{C}(A+\bar{A})$$

$$= \bar{A}\bar{C} + BC + \bar{B}\bar{C}$$

$$= A\bar{C} + B \oplus C$$

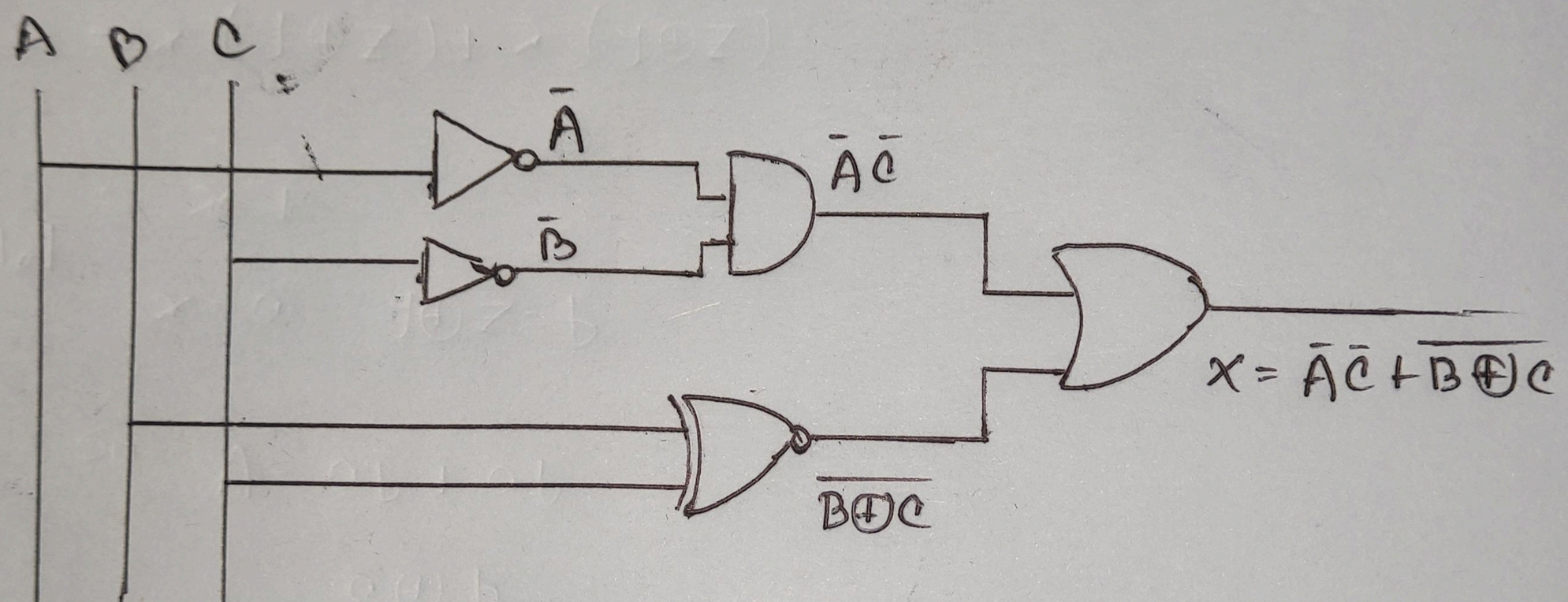

Figure: Logic circuit.