

GATE:EC-27-2022

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I. QUESTION

Select the boolean function(s) equivalent to $x + yz$, where x, y and z are Boolean variables, and $+$ denotes logical OR operation.

- (A) $x + z + xy$
- (B) $(x + y)(x + z)$
- (C) $x + xy + yz$
- (D) $x + xz + xy$

II. SOLUTION

Simplifying each option to their simplest form:

(A)

$$x + z + xy = x(1 + y) + z \quad (1)$$

$$= x + z \quad (2)$$

(B)

$$(x + y)(x + z) = x + xz + xy + yz \quad (3)$$

$$= x(1 + z) + xy + yz \quad (4)$$

$$= x(1 + y) + yz \quad (5)$$

$$= x + yz \quad (6)$$

(C)

$$x + xy + yz = x(1 + y) + yz \quad (7)$$

$$= x + yz \quad (8)$$

(D)

$$x + xz + xy = x(1 + z) + xy \quad (9)$$

$$= x(1 + y) \quad (10)$$

$$= x \quad (11)$$

Therefore option (B) and (C) are true.

The following is the implementation with a cpp code through esp-32 via Vaman.

<https://github.com/Gandubs/Digital-Design/blob/master/Assignments/ec'22-27/Codes/main.cpp>