GATE:EC-27-2022

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)

$$x + z + xy = x(1 + y) + z \tag{1}$$
$$= x + z \tag{2}$$

(B)

$$(x + y)(x + z) = x + xz + xy + yz \tag{3}$$
$$= x(1 + z) + xy + yz \tag{4}$$
$$= x(1 + y) + yz \tag{5}$$
$$= x + yz \tag{6}$$

(C)

$$x + xy + yz = x(1 + y) + yz \tag{7}$$
$$= x + yz \tag{8}$$

(D)

$$x + xz + xy = x(1 + z) + xy \tag{9}$$
$$= x(1 + y) \tag{10}$$
$$= x \tag{11}$$

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