Question 2

A. Consider the following Boolean algebraic expression to answer the questions below.

$$F = \bar{A}.\bar{B}.\bar{D} + \bar{A}.(\bar{B}.C.D + B.\bar{C}.\bar{D}) + (\bar{A}.B + A.\bar{B}).C.\bar{D}$$

i. Convert the expression F into a form of *Sum of Minterms*.
Note the term *"Sum of Minterms"* in the question.

[02 Marks]

ii. Complete the truth table below by filling the column F for the expression F given above.

[04 Marks]

Minterm Index	A	B	C	D	F
0	0	0	0	0	
1	0	0	0	1	
2	0	0	1	0	
3	0	0	1	1	
4	0	1	0	0	
5	0	1	0	1	
6	0	1	1	0	
7	0	1	1	1	
8	1	0	0	0	
9	1	0	0	1	
10	1	0	1	0	
11	1	0	1	1	
12	1	1	0	0	
13	1	1	0	1	
14	1	1	1	0	
15	1	1	1	1	

iii. It has been confirmed that, whenever both A and C inputs are in Boolean logic state **ONE (1)**, B and D inputs are produced **only** in equivalent states (equivalent states means either B and C both are **ONE** or **ZERO**). Therefore, a *minterm* with both A and C are in Boolean logic state **ONE (1)**, B and D are in mutually opposite Boolean logic states will never happen. Accordingly, list all *minterm(s)* that are *Don't care conditions* for this description.

[04 Marks]