Draw a block diagram, truth table and logic circuit of 1*16 Demultiplexer and explain its working principle.

Solution:

1 to 16 demultiplexer has one output data, four select lines A, B, C and D and 16 output lines Y0 to Y15. This is implemented using AND and NOT gate.

1 to 16 demultiplexer can be implemented using 1 to 8 demultiplexer, 1 to 4 demultiplexer and 1 to 2 demultiple



The below **truth table** shows the operation of 1 to 16 demultiplexer:

Inputs					Outp	Outputs														
A	S ₀	S ₁	S ₂	S ₃	Y ₀	Y ₁	Y ₂	Y ₃	Y ₄	Y ₅	Y ₆	Y ₇	Y ₈	Y ₉	Y ₁₀	Y ₁₁	Y ₁₂	Y ₁₃	Y ₁₄	Y ₁₅
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

1	х	x	х	х	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	х	x	х	х	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	х	x	х	x	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Logical circuit of the above expressions is given below:

