Hardware and Virtual Machines – 2021 A2 9618

1. Nov/2021//Paper_31/No.6

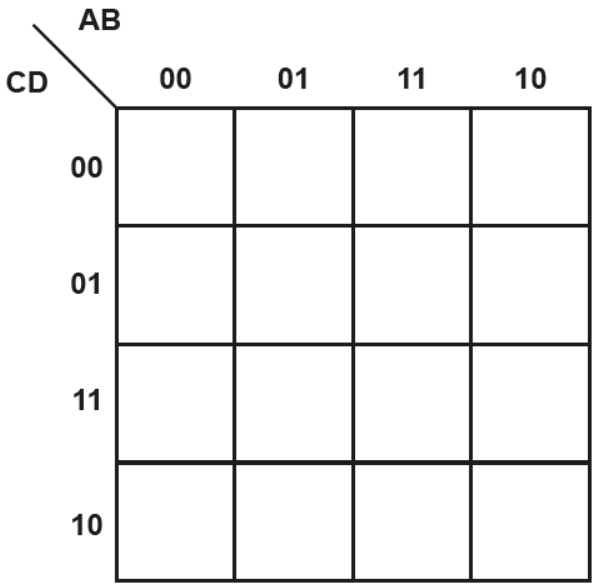
(a) Write the Boolean expression that corresponds to the given truth table as a sum-of-products.

INPUT				OUTPUT
A	B	C	D	Z
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	1
1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

Z = ...

..... [3]

(b) (i) Complete the Karnaugh map (K-map) for the given truth table.



[2]

(ii) Draw loop(s) around appropriate group(s) of 1s in the K-map to produce an optimal sum-of-products. [2]

(iii) Write the Boolean expression from your answer to **part b(ii)** as a simplified sum-of-products.

Z = ...

..... [2]

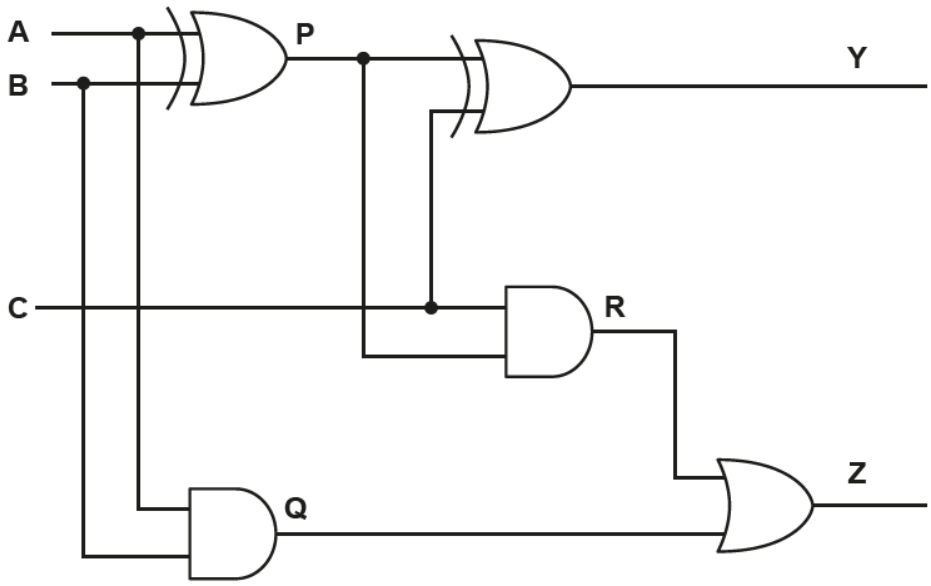
(iv) Write the simplified Boolean expression for your answer to **part b(iii)**.

Z = ...

..... [1]

2. June/2021//Paper_31/No.6

The diagram shows a logic circuit.



(a) Complete the truth table for the given logic circuit. Show your working.

Inputs			Working space			Outputs	
A	B	C	P	Q	R	Y	Z
0	0	0					
0	0	1					
0	1	0					
0	1	1					
1	0	0					
1	0	1					
1	1	0					
1	1	1					

[3]

(b) State the name of the logic circuit.

..... [1]

(c) Write the Boolean expressions for the two outputs **Y** and **Z** in the truth table as sum-of-products **and** state the purpose of each output.

Y = ...

Purpose .....

Z = ...

Purpose .....

[4]