

Part C: Circuit Design (20 marks)

For each of the Karnaugh maps below, perform the following tasks:

1. On the Karnaugh map, circle the groups that result in the greatest reduction of the original Sum-of-Minterms expression. **(3 marks each)**
2. In the space below each Karnaugh map, write the logical expression corresponding to this group. **(2 marks each)**

For full marks, the groupings for each K-map must result in the most reduced expression possible.

KM1	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	0	0	1	1
$\bar{A}B$	1	1	1	1
AB	0	0	0	0
$A\bar{B}$	0	0	1	1

KM1 = $\bar{A} \cdot B + \bar{B} \cdot C$

KM2	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	1	1	0	1
$\bar{A}B$	1	0	X	1
AB	1	0	X	1
$A\bar{B}$	1	1	0	1

KM2 = $\bar{D} + \bar{B} \cdot \bar{C}$

KM3	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	1	1	0	1
$\bar{A}B$	1	X	X	0
AB	0	X	X	1
$A\bar{B}$	1	0	1	1

KM3 = $\bar{A} \cdot \bar{C} + \bar{B} \cdot \bar{D} + A \cdot C$

KM4	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	1	1	0	1
$\bar{A}B$	0	X	X	0
AB	X	0	1	1
$A\bar{B}$	0	1	X	1

KM4 = $\bar{A} \cdot \bar{B} \cdot \bar{C} + A \cdot C + \bar{B} \cdot \bar{C} \cdot D + \bar{B} \cdot C \cdot \bar{D}$