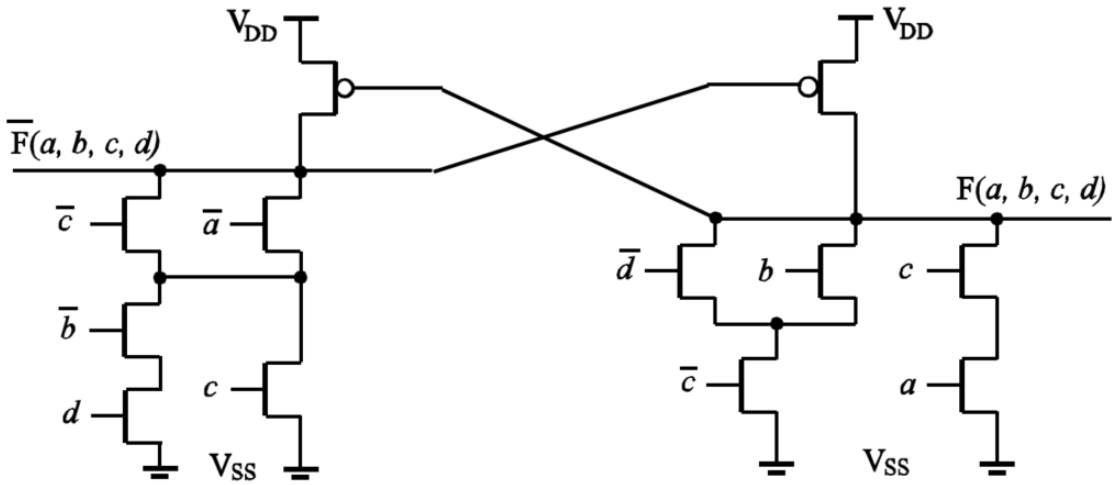
Problem 1 (2p)

The logic circuit drawn in the following figure implements what combinational function:



(A) $F(a, b, c, d) = a\bar{c} + bc\bar{d}$

(B) $F(a, b, c, d) = (b\bar{d} + c)(a + \bar{c})$

(C) $F(a, b, c, d) = \overline{\bar{c}(b + \bar{d}) + ac}$

(D) $F(a, b, c, d) = \overline{(a + c)(b + \bar{c} + \bar{d})}$.

Problem 2 (2p)

The logic function described by the following Veigh-Karnaugh map has the logic expression:

a \ bc	00	01	11	10
0	0	0	1	$\bar{d}$
1	0	d	1	*

(A) $F(a, b, c, d) = ac + \bar{a}b\bar{d}$

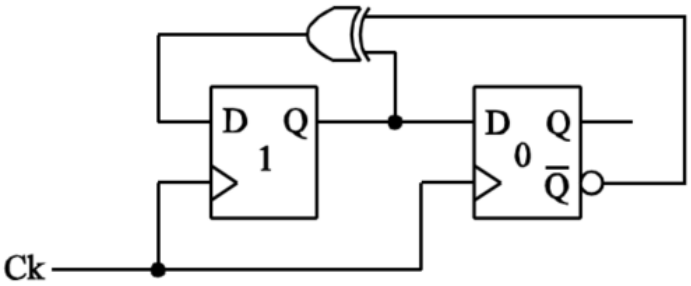
(B) $F(a, b, c, d) = (b + d)(c + \bar{d})$

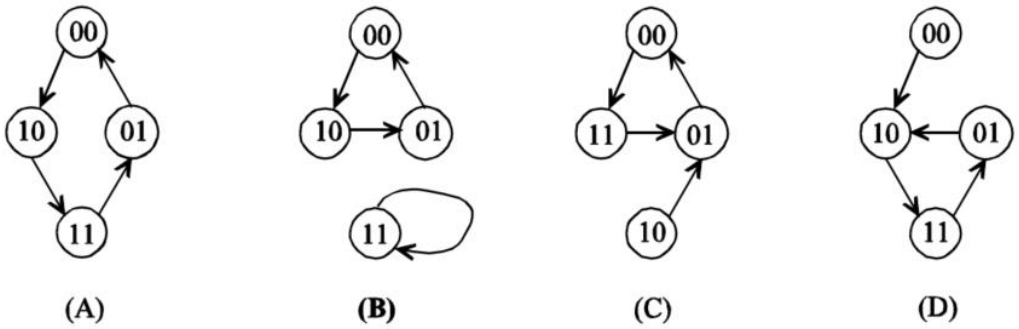
(C) $F(a, b, c, d) = (c + \bar{d})(a + b)$

(D) $F(a, b, c, d) = bc + acd + b\bar{d}$

Problem 3 (2p)

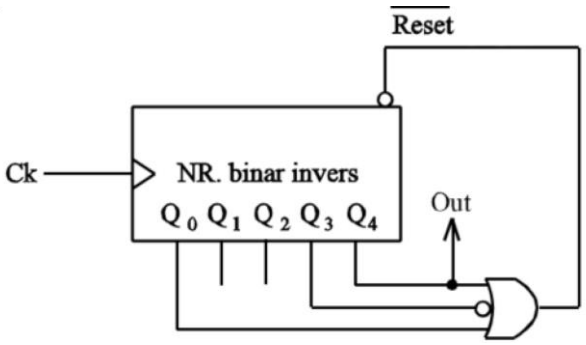
The synchronous sequential circuit drawn in the following figure has the state defined by $Q_1Q_0 \in \{00,01,10,11\}$. Specify which of the following transition graphs corresponds to this circuit.





Problem 4 (3p)

The reverse binary counter with feedback drawn in the following figure achieves at the Q_4 output (which is also the MSB - most significant bit) the frequency division of the clock signal Ck by the factor:



(A) 18 (B) 19 (C) 26 (D) 20.

Answers, in order: C, D, B, A.

Total: 9p + 1p = 10p