EEE104 – Digital Systems - Interim Test 2009
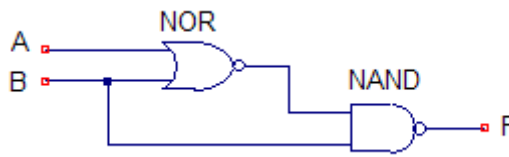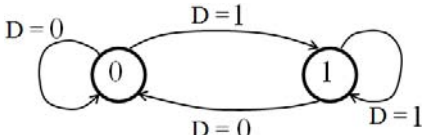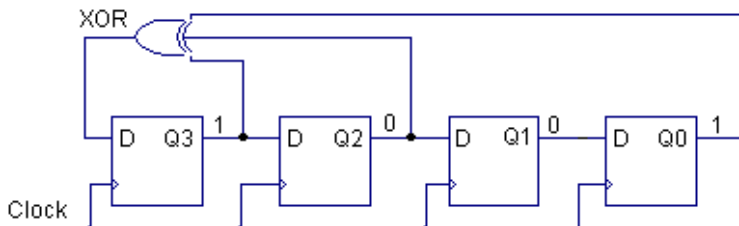
Answer All questions by writing the answer in the appropriate box provided

1 Write down the value for A B C D that will satisfy the Boolean expression below. $$\overline{A.B.\overline{\overline{C}.\overline{D}}} = 0$$			

A	B	C	D
1	1	0	0

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2 Complete the following Boolean expressions:

(where A' represents NOT A)

i. $A + 1 = 1$ **ii.** $A + A' = 1$

iii. $A + A = A$ **iv.** $A + 0 = A$

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3 Express the decimal number -39 as an eight bit binary 2's complement number.

11011001

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4 Complete the truth table for the circuit below.

A B	F
0 0	1
0 1	1
1 0	1
1 1	1

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5 Write down the dual of the expression $X.0 = 0$

(duality principle)

$X + 1 = 1$

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6 Complete the truth table for the 2-to-1 multiplexer given by:

S	Y
0	A
1	B

where S is the select line,

A,B are the data inputs

Y is the output

S A B	Y
0 0 0	0
0 0 1	0
0 1 0	1
0 1 1	1
1 0 0	0
1 0 1	1
1 1 0	0
1 1 1	1

Please Turn Over

7	What binary number is represented by the hexadecimal number DA	11011010

8	Express the function $F(A,B) = A$ **XNOR** B as a fundamental product of sums.	$(A + \overline{B})(\overline{A} + B)$

9 Complete the truth table for a half adder with inputs A and B

A B	SUM	CARRY
0 0	0	0
0 1	1	0
1 0	1	0
1 1	0	1

10 Complete the state diagram for a D-Type flip-flop, by filling in the D input values on the directed lines.

11	What is the frequency in MHz of a clock waveform that has a pulse width of 10ns and a duty cycle of 20%	20 MHz

12 The linear feedback shift register shown below is in the state 1001. What will the new stable state be after the next **two** clock pulses have been applied?

Q3 = 1

Q2 = 0

Q1 = 1

Q0 = 0

Examiner Use Only:

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