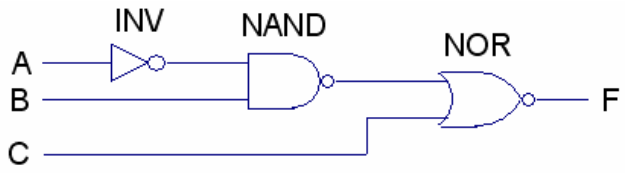
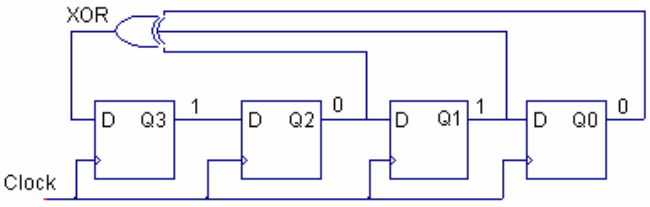
EEE104 – Digital Systems - Interim Test 2005

1	Which **one** of the following best describes a quantity that has continuous values: A) a digital quantity B) a vector quantity C) a binary quantity D) an analog quantity E) a natural quantity F) none of these	D) An analog quantity.
2	Complete the following Boolean expressions:	**i.** X + 1 = 1 **ii.** X.X = X **iii.** X + X = X **iv.** X.0 = 0
3	What decimal number is represented by the 2's complement number 11101001?	MSB is 1, so it represents a negative number. Reversing the 2's complement process gives the magnitude, 00010111 which is -23 in decimal.
4	What are the values of *A*, *B*, and *C* that will make the function *F* equal to the logical value of **1**? 	A = 0, B = 1, C = 0 To make F equal to 1, the inputs to the NOR must be 00. To make the output of the NAND 0, its inputs must be 11. To make the output of the inverter 1, its input must be 0.
5	Express the function *F(A,B) = A + B* as a fundamental sum of products.	$F = \bar{A}.B + A\bar{B} + A.B$ Minterms taken straight from OR truth table.
6	A multiplexer is a digital circuit that: **A:** Converts information to a coded form. **B:** Adds two bits to produce a sum and a carry. **C:** Switches data from one input line to several output lines. **D:** Converts coded information to a familiar form. **E:** Stores binary data until it is needed. **F:** Switches digital data from several inputs to a single output. **G:** Compares two data words for equality. **H:** None of these.	F) Switches digital data from several inputs to a single output.
7	Convert the decimal number 697 to binary coded decimal.	Convert each digit separately. 0110 1001 0111

8 Write down the three values that will make the function F equal to 0. $F(A,B,C) = (A + \overline{B} + C)(A + \overline{B} + \overline{C})(\overline{A} + \overline{B} + C)$	For a POS, any sum term evaluating to 0 will make the function 0. i) A = 0 , B = 1 , C = 0 ii) A = 0 , B = 1 , C = 1 iii) A = 1 , B = 1 , C = 0
9 Write down the truth table for a half adder, with inputs A and B. Clearly show the sum and carry outputs.	A B Sum Carry 0 0 0 0 0 1 1 0 1 0 1 0 1 1 0 1
10 Which of the following codes exhibits even parity? A) 11000100 B) 11111111 C) 01111111 D) 10101000 E) 10000000 F) None of these	For even parity, we need an even number of 1's. Only B) 11111111 satisfies this.
11 What is the frequency in MHz of a clock waveform that has a pulse width of 400ps and a duty cycle of 20%	Period = 400ps x (100/20) = 2000ps Frequency = 1/2000ps = 500MHz
12 The linear feedback shift register shown below is in the state 1010. What will the new stable state be after the next clock pulse has been applied? 	XOR output is 1 and this will be shifted into flip flop 3. The other bits will be shifted to the right one place giving 1101 when the circuit receives its next clock pulse.