THE OPEN UNIVERSITY OF SRI LANKA
B.Sc DEGREE PROGRAMME: LEVEL 04
OPEN BOOK TEST: 2010
CSU 2178: DIGITAL COMPUTER FUNDAMENTALS
DURATION: ONE AND HALF HOURS (1 ½ HOURS)

Date: 25th February, 2010 Time: 4.00 pm – 5.30 pm

Answer ALL questions.

Q1.

a. "*Any logical gate can be implemented by using NAND gate(s).*" Explain this statement by using suitable truth tables and logic circuits.

b. Consider the following truth table and answer the questions from b (i) to b (iv).

A	B	C	D	out
0	0	0	0	X
0	0	0	1	X
0	0	1	0	0
0	0	1	1	0
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	X
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

i. Write a logical expression for the above truth table.

ii. By using the K-MAP method, define the minimal expression for the above expression.

iii. Draw the logical circuit diagram for the minimal expression in part (ii) above using basic logic gates (NOT, 2 input AND, 2 input OR).

iv. Draw the logical circuit diagram for the minimal expression in part (ii) above using 2 input NAND gates.

Q2.

a. Briefly describe the following terms (components) by using functions, truth tables and circuit diagrams.

   i. Multiplexers

   ii. J-K Flip-Flops

   iii. Decoders

b. Create a 16-to-1 multiplexer by using only 4-to-1 Multiplexers. (Do not use any other gates)

c. Simplify the following expressions by using suitable Multiplexer(s). (use 8-to-1 or 16-to-1 multiplexers only)

   i. $F = \bar{A}.\bar{B}.\bar{C} + A.B.\bar{C} + \bar{A}.B.C + A.\bar{B}.C$

   ii. $F = \bar{C}.\bar{D} + \bar{A}.\bar{C} + \bar{A}.\bar{D}$

Q3.

a. Briefly describes the following terms (components).

   i. 7- Segment displays

   ii. Registers

b. Draw a circuit diagram and a counter sequence for synchronous 4 bit up - counter. (use J-K Flip-flops)

c. What are the differences between CMOS and TTL ICs?

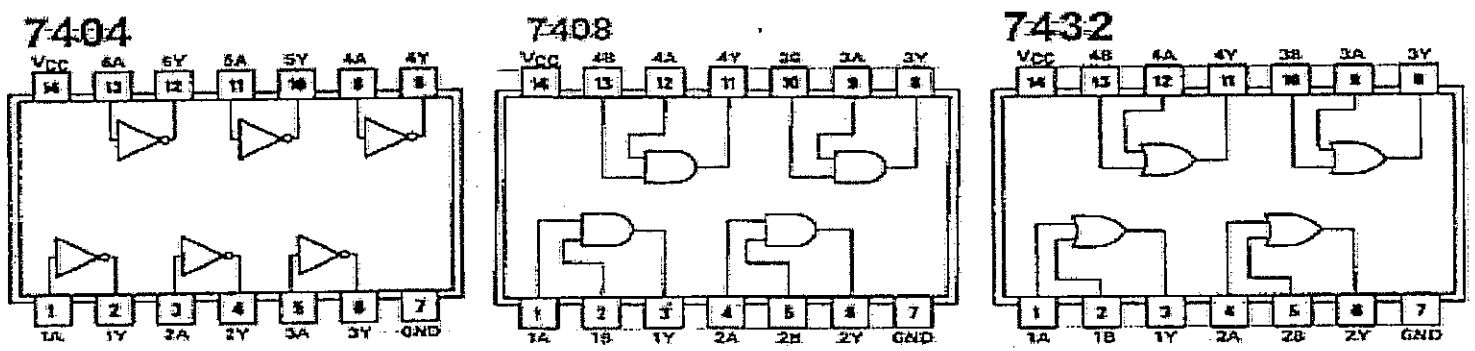
d. Draw an electronic circuit diagram for the following expression. (Use the given diagram sheet and attach it to your answer book)

$$F = A.\bar{B} + A.\bar{C} + \bar{A}.D + C.D$$

Index No:

5V +

out



A

B

C

D

-COM