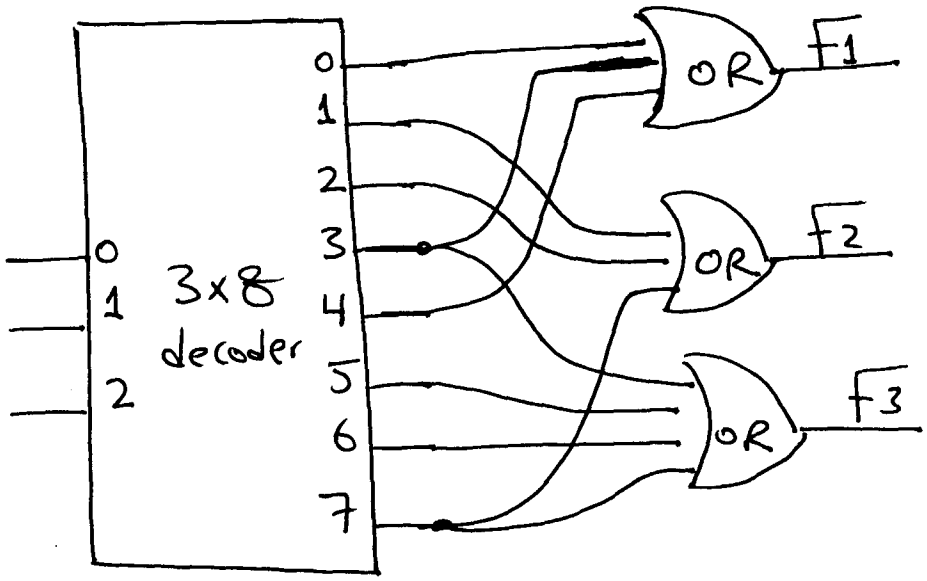
Nile High Institute For Engineering and Technology
Department: Communication
Level: 200
Type: 1st term

Model ANS

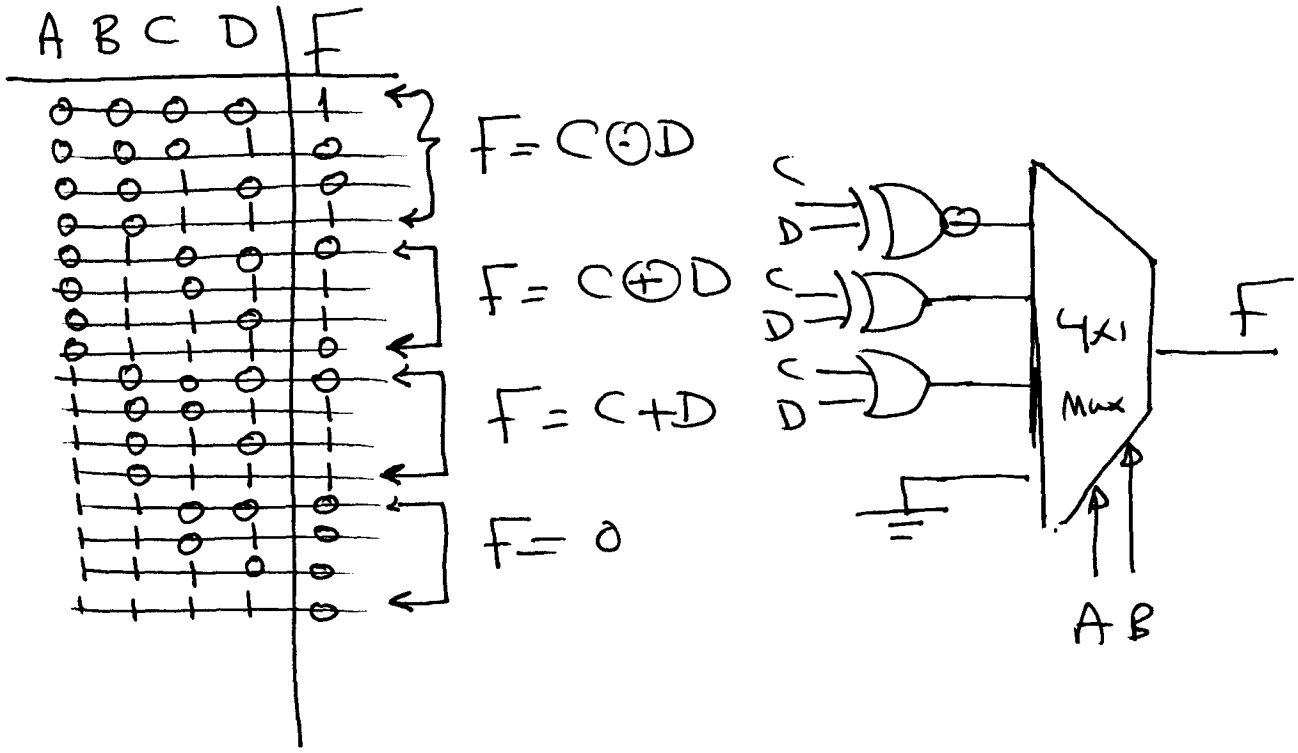
Course-Title: Digital & Logic Circuit
Course-Code: ELE 221
Date: 24 / 12 / 2017
Total Marks: 50 Points
Time allowed: 2 hour(s)

Question-1 (20 Points)

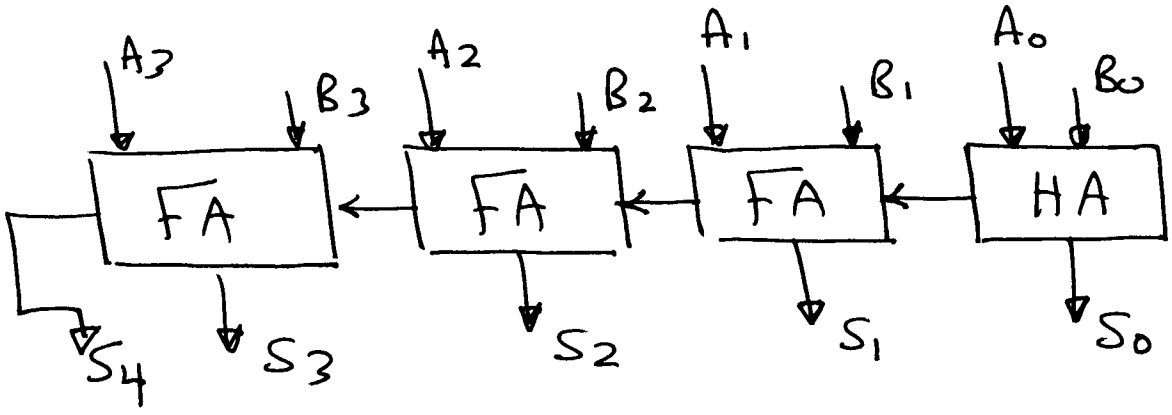
A. A combinational circuit is specified by the following three Boolean functions:
$F_1 = \sum(0,3,4)$ $F_2 = \sum(1,2,7)$ $F_3 = \prod(0,1,2,4)$
Implement the circuit with a **decoder** and **external OR** gate



Implement the following Boolean function $F(A, B, C, D) = \sum(0,3,5,6,9,10,11)$ with **4 × 1** Multiplexer (Do not use 8 × 1 MUX)



C. **Design a 4-bit binary parallel adder** using only **half adder and full adder**



D. Design a logic circuit that computes the function $f(x) = x^2 - x + 2$ for a 2-bit number x

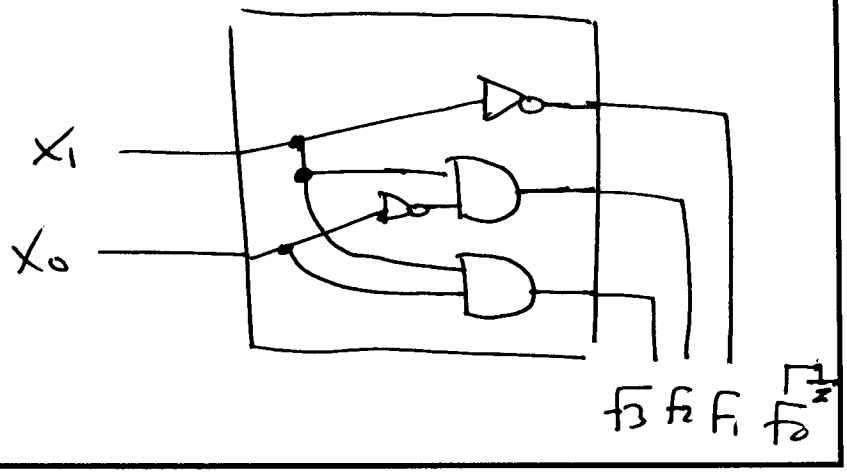
X_1	X_0	f_3	f_2	f_1	f_0
0	0	0	0	1	0
0	1	0	0	1	0
1	0	0	1	0	0
1	1	1	0	0	0

$f_0 = 0$

$f_1 = \overline{X_1}$

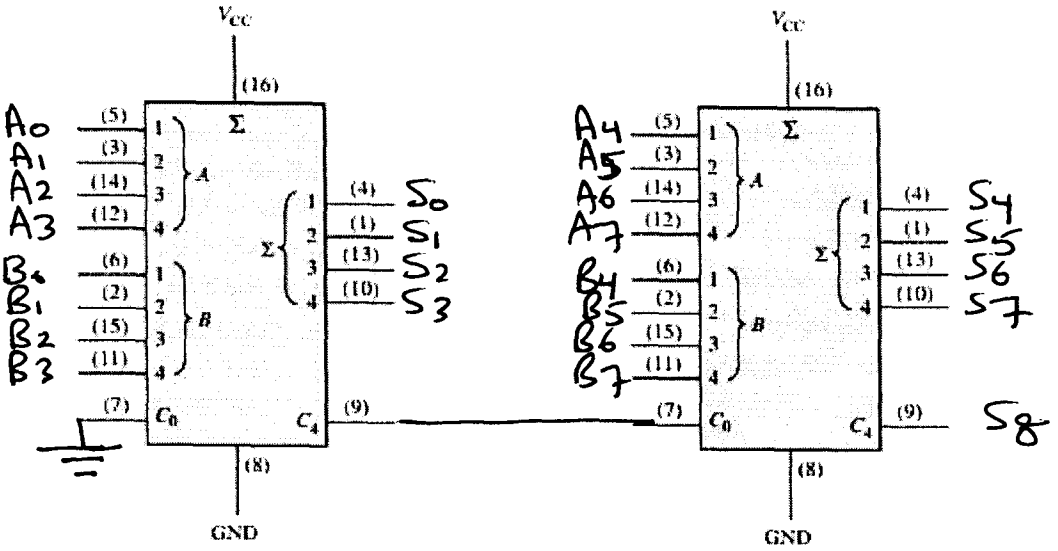
$f_2 = X_1 \overline{X_0}$

$f_3 = X_1 X_0$

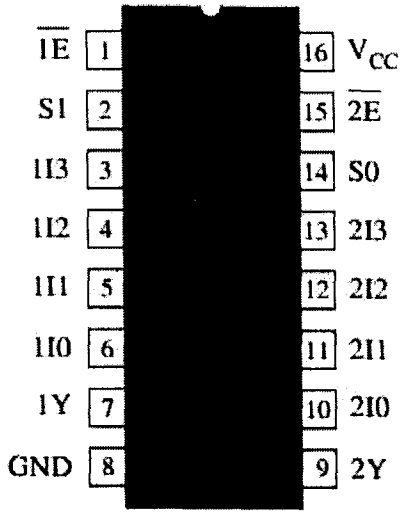


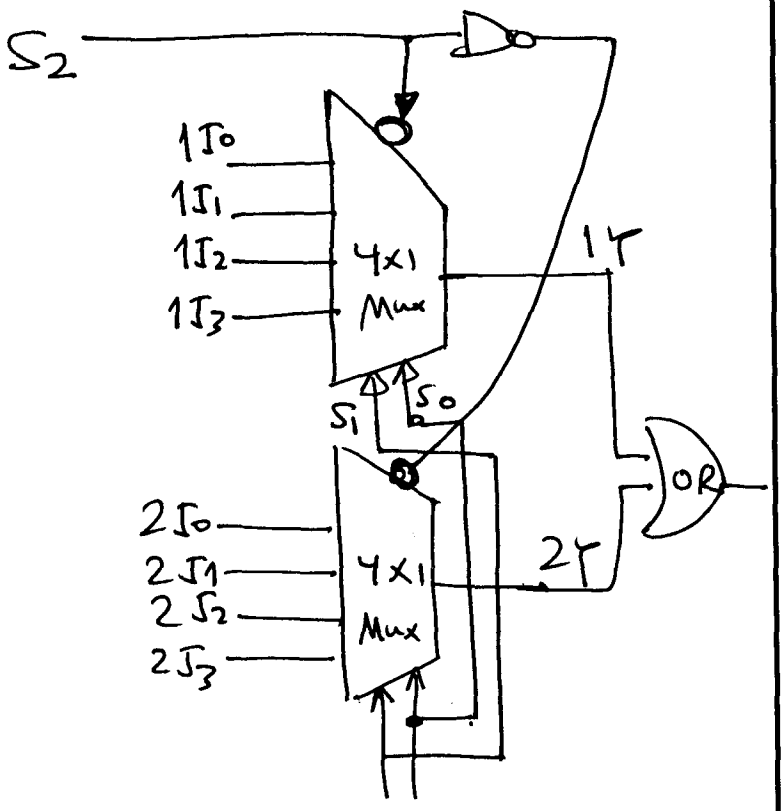
Question-2 (10 Points)

A. Show how two **74HC283** adders can be connected to form an **8-bit parallel adder**.



B. Use The **74HC153 dual four-input data selector/multiplexer** and any other logic necessary to **multiplex 8 data lines** onto a single data-output line.

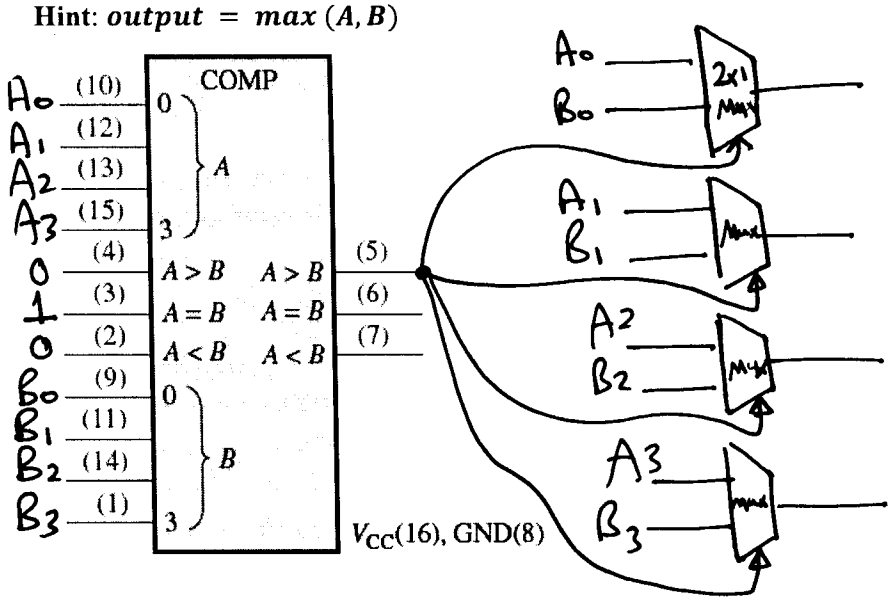




Question-3 **(20 Points)**

A. Design a digital circuit that can **output the maximum number** between two 4-bit numbers A and B

Hint: $output = max(A, B)$

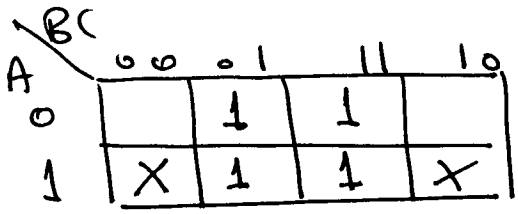


B. Use Karnaugh map to obtain minimized SOP for the following function

Hint: **d**: do not care

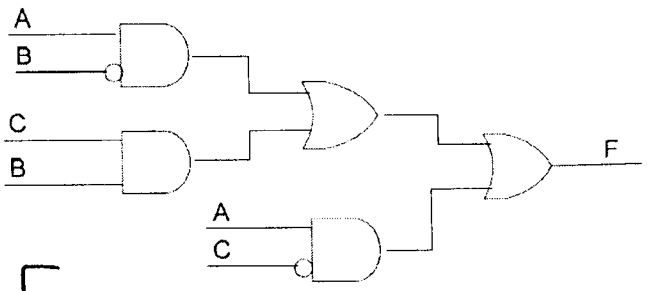
$F(A, B, C) = \sum(1,3,5,7) \quad d(A, B, C) = \sum(4,6)$

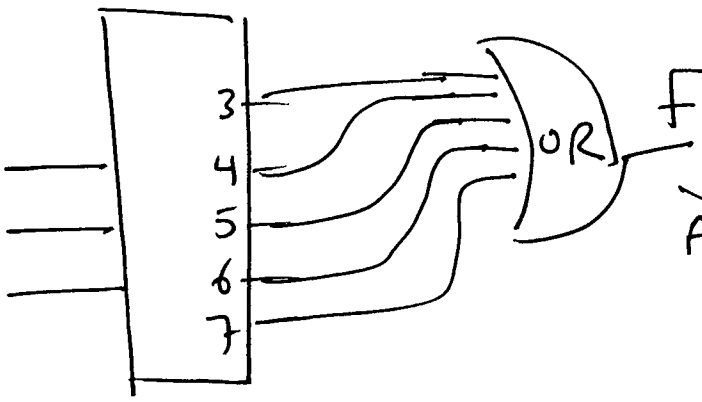
$F = C$



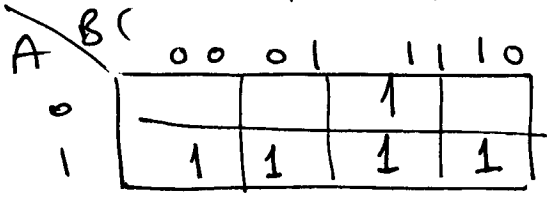
C. Implement the function **F** represented by the logic diagram shown next by using **decoder**

$F = \overline{\sum}(3,4,5,6,7)$





$F = A\overline{B} + CB + A\overline{C}$



BEST WISHES