First Assignment questions

1) A processor unit employs a scratchpad memory as in Fig. 9-2. The processor consists of 64 registers of eight bits each.

(a) What is the size of the scratchpad memory?

(b) How many lines are needed for the address?

(c) How many lines are there for the input data?

(d) What is the size of the MUX that selects between the input data and the output of the shifter? (1)

2. TTL IC type 7487 is a 4-bit true /complement, zero/one element. One stage of this IC is shown in figure

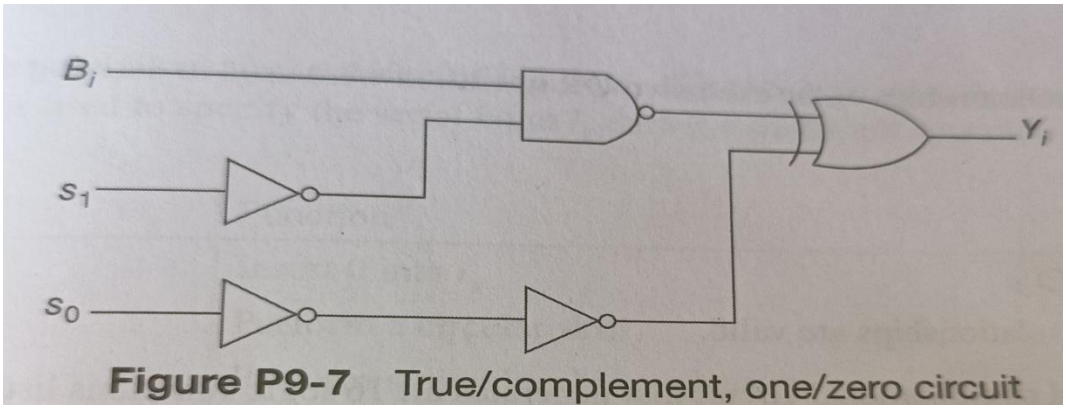

Figure P9-7 True/complement, one/zero circuit

(a) Derive the Boolean function for output Y_i as a function of inputs B_i, s_1, and s_0

(b) Draw the truth table for the circuit.

(c) Draw a function table and verify the circuit operation (2)

3. Design an arithmetic circuit with two selection variable s_1, and s_0 that generate the following arithmetic operation. Draw the logic diagram of one typical stage.

s_1	s_0	$C_{in} = 0$	$C_{in} = 1$
0	0	$F = A + B$	$F = A + B + 1$
0	1	$F = A$	$F = A + 1$
1	0	$F = \overline{B}$	$F = \overline{B} + 1$
1	1	$F = A + \overline{B}$	$F = A + \overline{B} + 1$

(2)

4. Registers R1 and R2 of a computer contain the decimal values 1200 and 4600. What is the effective address of the memory operand in each of the following instruction

(a) LOAD 20(R1), R5

(b) Move #3000, R5

(c) Store R5, 30(R1,R2)

(d) Add –(R1), R5

(e) Subtract (R1)+, R5 (1)

5. Register R6 is used in a program to point to the top of a stack containing 32-bit numbers. Write a sequence of instructions using the Index, Autoincrement, and Autodecrement addressing modes to perform each of the following tasks:

(a) Pop the top two items off the stack, add them, then push the result onto the stack.

(b) Copy the fifth item from the top into register R3. For each case, assume that the stack contains ten or more elements (2)

6. Give the sequence of control steps required to perform the operation Add [R3], R1 in a single-bus organization. (2)

7. Write about multiplication of signed numbers. (2.5)

8 Write about array multiplier. (2.5)