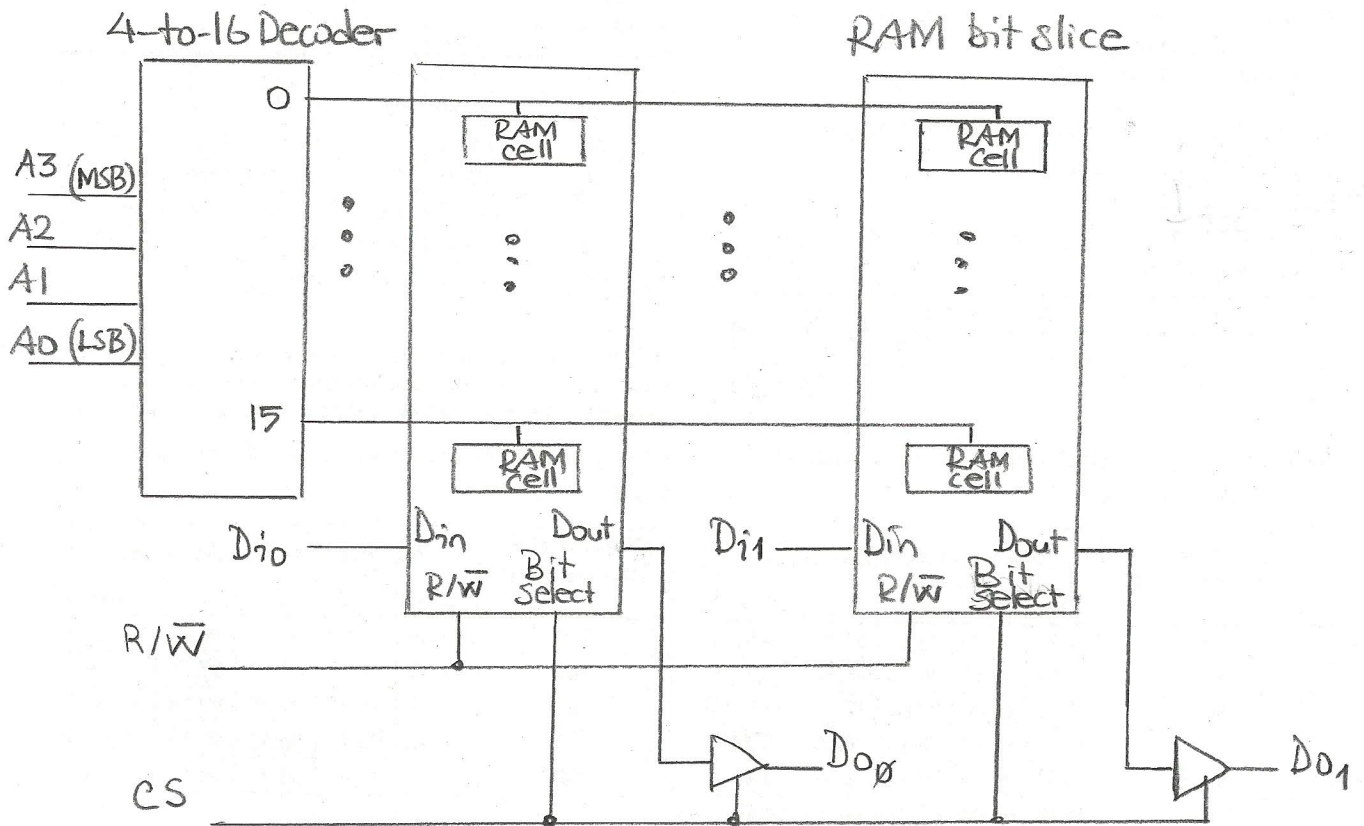
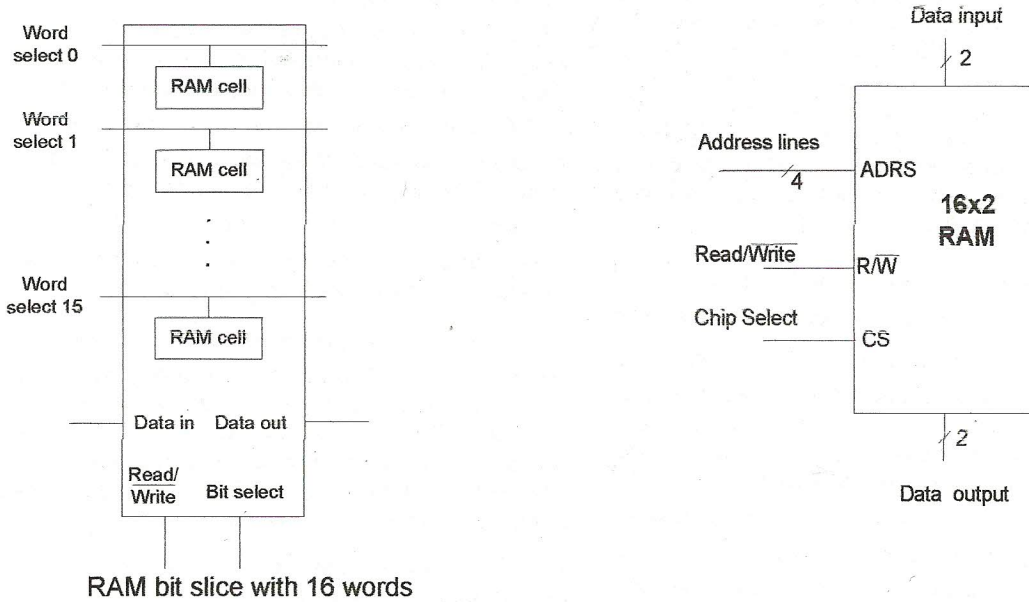


SOLUTIONS

40 minutes

1. Construct 16x2 RAM using the RAM bit slice with 16 words, 4-to-16 decoder and two tristate buffers. (40pts)



The tristate buffers can be omitted if they are available in the RAM bit slices.

2. A datapath similar to the one given in Fig.1 has 128 registers. How many selection lines are needed for each set of multiplexers and for the decoder? (10pts)

$128 = 2^7$ 7 selections lines
for mux and decoder

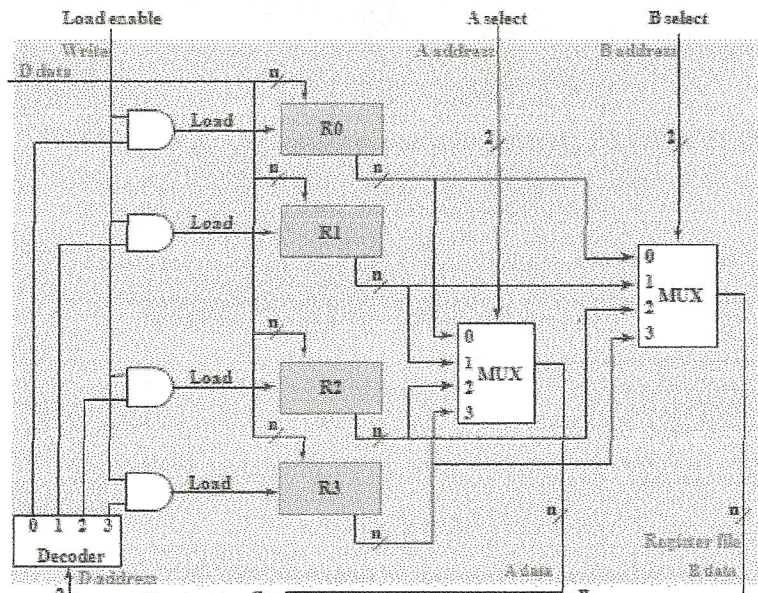
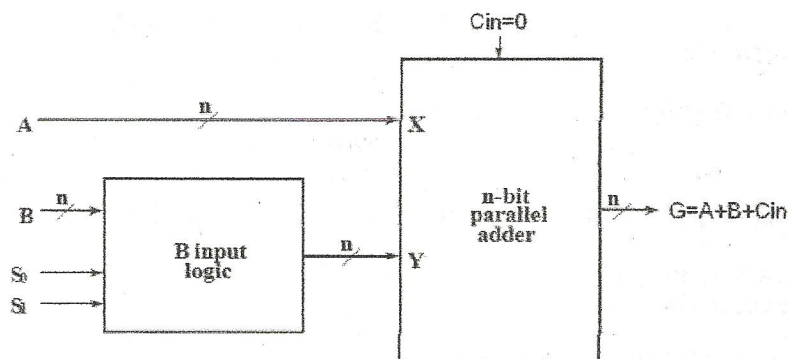


Fig 1. Datapath

3. Explain the function of the program counter (PC) in computer? (10pts)

Program counter (PC)
a register in CPU
that provides
addresses for
instructions. PC can
count up. A new address
based on the
instructions,
such branch, jump,
etc, can be loaded
into the program counter.

4. Find all the operations implemented with the arithmetic circuit given in Fig.2. The function table for the B input logic is as given below. Assume signed 2's complement for the negative numbers. (40pts)



S1	S0	Y
0	0	All 1s
0	1	$\bar{B}$
1	0	B
1	1	All 0s

Fig 2. Arithmetic circuit

S1	S0	Y	G=A+B (Cin=0)
0	0	All 1s	A-1 (Increment)
0	1	$\bar{B}$	A+ $\bar{B}$
1	0	B	A+B (add)
1	1	All 0's	A (transfer)