ELEC 464 : MICROCOMPUTER SYSTEM DESIGN
FALL 1995

Assignment 4 - Solutions

Question 1

The 64 kB (2^{16}) EPROM block requires the 16 LS address bits for internal addresssing so the upper 24-16=8 bits must be decoded. The 32 kB (2^{15}) RAM block requires the 15 LS address bits for internal addresssing so the upper 24-15=9 bits must be decoded.

The truth table (showing truth values, not signal levels) is:

Inputs										Outputs	
A23	A22	A21	A20	A19	A18	A17	A16	A15	AS*	RAM*	ROM*
0	0	0	0	0	0	0	0	0	1	1	0
0	0	0	0	0	0	1	0	X	1	0	1
X	X	X	X	X	X	X	X	X	0	0	0

Question 2

The device has two states represented using one state variable. The truth table now shows the current state and the next state.

Inputs						Outputs		
running	A23 – A18	A17	A16	A15	AS*	RAM*	ROM*	running’
0	0	0	0	0	1	0	1	0
0	0	1	0	X	1	0	1	1
0	X	X	X	X	0	0	0	0
1	0	0	0	0	1	1	0	1
1	0	1	0	X	1	0	1	1
1	X	X	X	X	0	0	0	1

Question 3

Five states are required to obtain the three clock period delay plus a state in which DTACK is inactive. The states are encoded using 3 state variables (A, B, C). The truth table follows from the description of the problem (we ignore the state of CS during the 3 wait states):

Inputs				Outputs			
A	B	C	CS*	A’	B’	C’	DTACK*
0	0	0	0	0	0	0	0
0	0	0	1	0	0	1	0
0	0	1	X	0	1	0	0
0	1	0	X	0	1	1	0
0	1	1	X	1	0	0	0
1	0	0	0	0	0	0	1
1	0	0	1	1	0	0	1