CS221: Digital Design

Full Mark – 30 **Time 40 min.**

1.	An asynchronous sequential circuit is described by the excitation function $Y = x_1x_2' + (x_1 + x_2')y$ and the output function $z = y$ (a) Draw the logic diagram of the circuit. (b) Derive the transition table and output map. (c) Obtain a two-state flow table.	[2+(3+2)+3=10]
2.	Find a circuit that has no Static hazards and implements the Boolean function $F(a,b,c,d) = \Sigma(0, 2, 6, 7, 8, 10, 12)$	[10]
3.	Suppose you are given an asynchronous counter module (mod-8) i.e., it counts (0, 1, 2, 3, 4, 5, 6, 7). (a) How many such sequences are possible for a mod-n (n>=2) counter? (b) Use the asynchronous counter (Mod-8) to design a counter that counts the ordered sequence (1, 2, 3, 5, 4, 6, 0, 7). [Hints: - You can use other logic circuit elements such as and, or, not gates.]	[2 + 8 = 10]