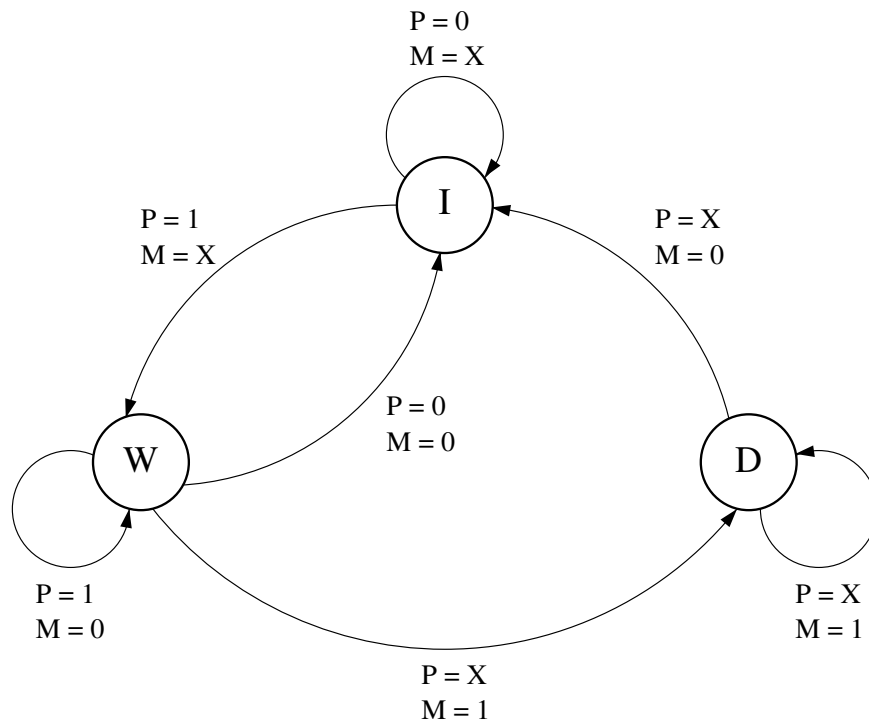


2010 Paper 2 Question 2

Digital Electronics

- (a) With the aid of appropriate diagrams, briefly explain the operation of Moore and Mealy finite state machines and highlight their differences. [7 marks]
- (b) A Boolean output Y is to be set to binary “1” for one clock cycle when the sequence 10010 is detected in a stream of serial digital data. The system is only to respond to non-overlapping sequences. Draw the state diagram for this system. [6 marks]
- (c) A machine is in one of three states: Idle (I), Working (W) and Down (D). The machine has two binary inputs: “processing” (P) and “malfunction” (M). The state diagram of the machine is as follows, where X means “don’t care”



and the state assignment $I = [00]$, $W = [01]$ and $D = [10]$. Note that state = $[Q_1Q_2]$ where Q_n is the output flop flip-flop n .

- (i) Write down the state table. [3 marks]
- (ii) Assuming the use of D-type flip-flops for the state registers, derive the minimised Boolean expressions for the next-state functions. [4 marks]