

考生注意: 1. 依次序作答, 只要標明題號, 不必抄題。

2. 答案必須寫在答案卷上, 否則不予計分, 並限以藍黑色筆作答。

3. 試題隨卷繳回。(餘詳詳閱試場規則)

一. Simplify the following Boolean functions, using a map.

(10%) (a) $F(A, B, C, D, E) = \sum m(10, 12, 14, 20, 22)$

(10%) (b) $F(A, B, C, D, E) = \sum m(21, 22, 23) + \sum m(24, 25, 26, 27, 28, 29, 30, 31)$

(10%) (a) Implement Boolean function $F = D[\bar{D}E + (C + \bar{E})C(A + B)]$ with NOR Gates.

(10%) (b) Implement Boolean function $F = \bar{E} + D(\bar{C} + AB)$ with NAND Gates.

三. Design and implement an up-and-down synchronous binary counter using the J-K flip-flops for the two cases:

(a) count by -3

(b) count by -5

(30%) (iv) Design a sequential circuit for the state diagram given in Fig 1 using S-R flip-flops.

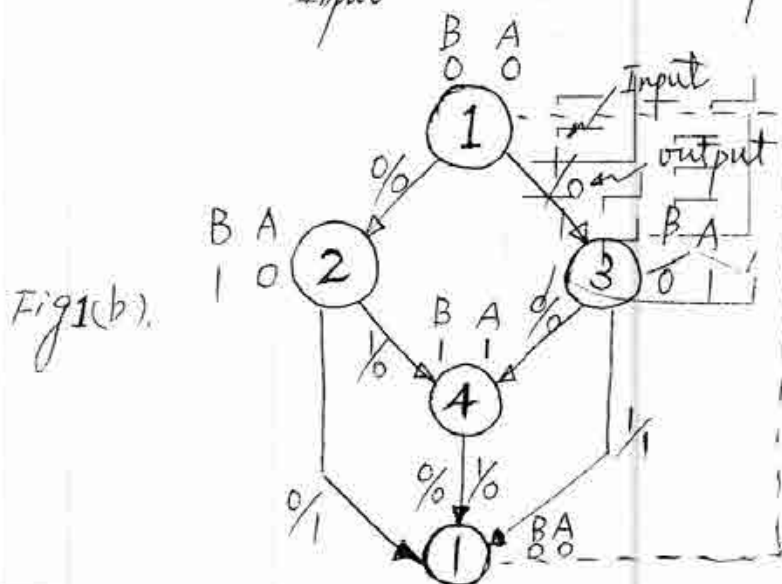
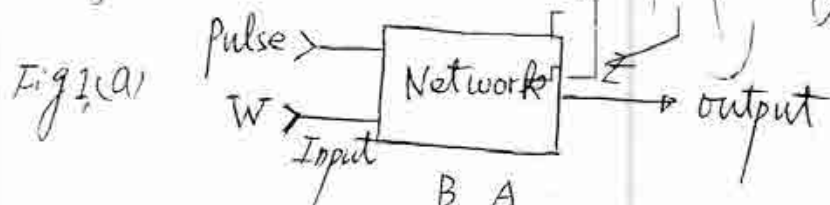


Fig 1.