

EE6111 2024-2025 Semester 2 | 第 1 题

1. Consider convolutional encoder as shown in Figure 1.

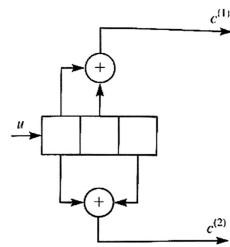
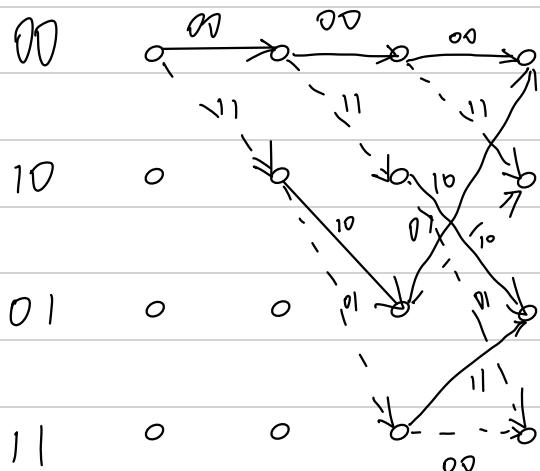
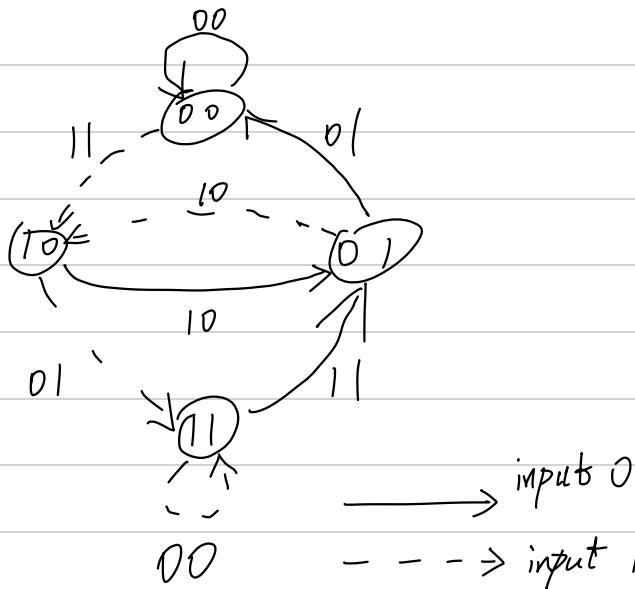


Figure 1

- (a) Draw the trellis diagram of the convolutional code.



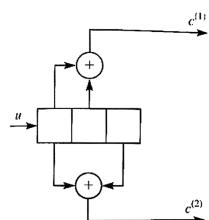
解题思路:

1. 先根据编码器的结构，画出状态转移图
2. 根据状态转移图，画出 Trellis Diagram.

Trellis Diagram 可理解为状态转移图引入了时间序

Trellis Diagram 的初始状态默认为 00

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- (b) What is the encoded message if  $u =$  (first bit) 10101011 (last bit)?  
(assuming the registers of the encoder are of zero value at the initial stage)

input: 1 0 1 0 1 0 1 1 0 0

encode: 11 10 10 10 10 10 10 0 11 0

状态	
<u>1 0 0</u>	1 1
<u>0 1 0</u>	1 0
1 0 1	1 0
0 1 0	1 0
1 0 1	1 0
0 1 0	1 0
1 0 1	1 0
<u>1 1 0</u>	0 1
<u>0 1 1</u>	1 1
0 0 1	0 1

- (c) What is the decoded message if there are mistakes in the first three bits when you received the encoded message from (b)?

(8 Marks)

encoded: 11 10 10 10 10 10 10 0 11 0

decoded: 00 00 10 10 10 10 10 0 11 0

