

國立臺北科技大學九十七學年度碩士班招生考試

系所組別：2320 資訊工程系碩士班乙組

第二節 通訊概論 試題

填准考證號碼

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第一頁 共二頁

注意事項：

1. 本試題共五題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. Answer the following questions:

- (1) What is the meaning (or definition) of the "threshold" in the FM threshold effect?
What kind of FM receivers can be used to reduce the threshold effect? (6%)
- (2) Give a plot to explain the meaning of "eye pattern," and specify the region and the meaning of "eye opening". (7%)
- (3) In a multiplexed system, there are techniques applied to accommodate synchronization between inputs. Explain the meaning or operation of "elastic store" and "justification". (6%)
- (4) Given two uncorrelated stationary processes $X(t)$ and $Y(t)$, find the $R_z(\tau)$ for $Z(t)=X(t)+Y(t)$. (6%)

2. The output of a running integrator is defined by

$$y(t) = \int_{t-T}^t x(\tau) d\tau,$$

where $x(\tau)$ is the input and T is the integration period. Assuming that both input and output are the sample functions of stationary processes $X(t)$ and $Y(t)$, respectively.

- (1) Find the impulse response of the running integrator. (10%)
- (2) Find the power spectral density $S_y(f)$ of the integrator's output, in terms of the power spectral density $S_x(f)$ of the input. (10%)

3. A (3,2) convolutional coder is shown in Fig. 1. It consists of a 3-stage shift register and 2 modulo-2 adders. The coded output stream is obtained by sampling the adders in sequence via a commutator.

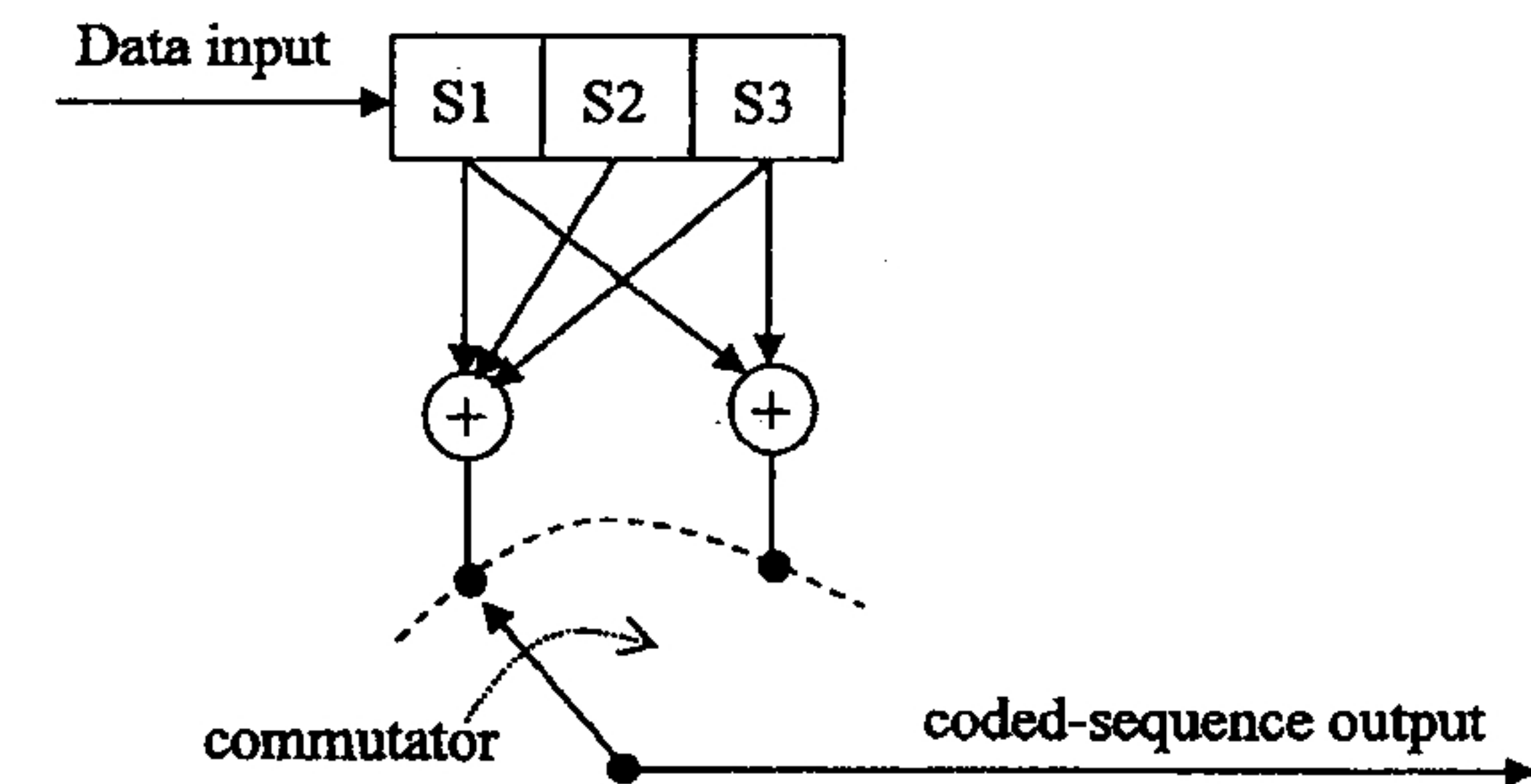


Fig. 1 Convolutional coder

- (1) Given the input data 11010, what is the output data sequence of the coder? (6%)
 - (2) As you know, the coding and decoding can be facilitated by a *code tree*. However, a better way is to represent the behavior of the coder by a state diagram. Please plot the state diagram for the (3,2) convolutional coder. (8%)
 - (3) Name at least two methods to decode the coded-sequence from a convolutional coder, and then compare the decoding methods you listed. (6%)
4. Consider a binary symmetric channel as shown in Fig. 2. Given $p(x_1) = r$ and $p(x_2) = 1 - r$.
- (1) Derive and plot the channel capacity as a function of p . (10%)
 - (2) Given $r = 0.5$ and $p = 0.7$. Find the channel capacity C of the channel. (5%)

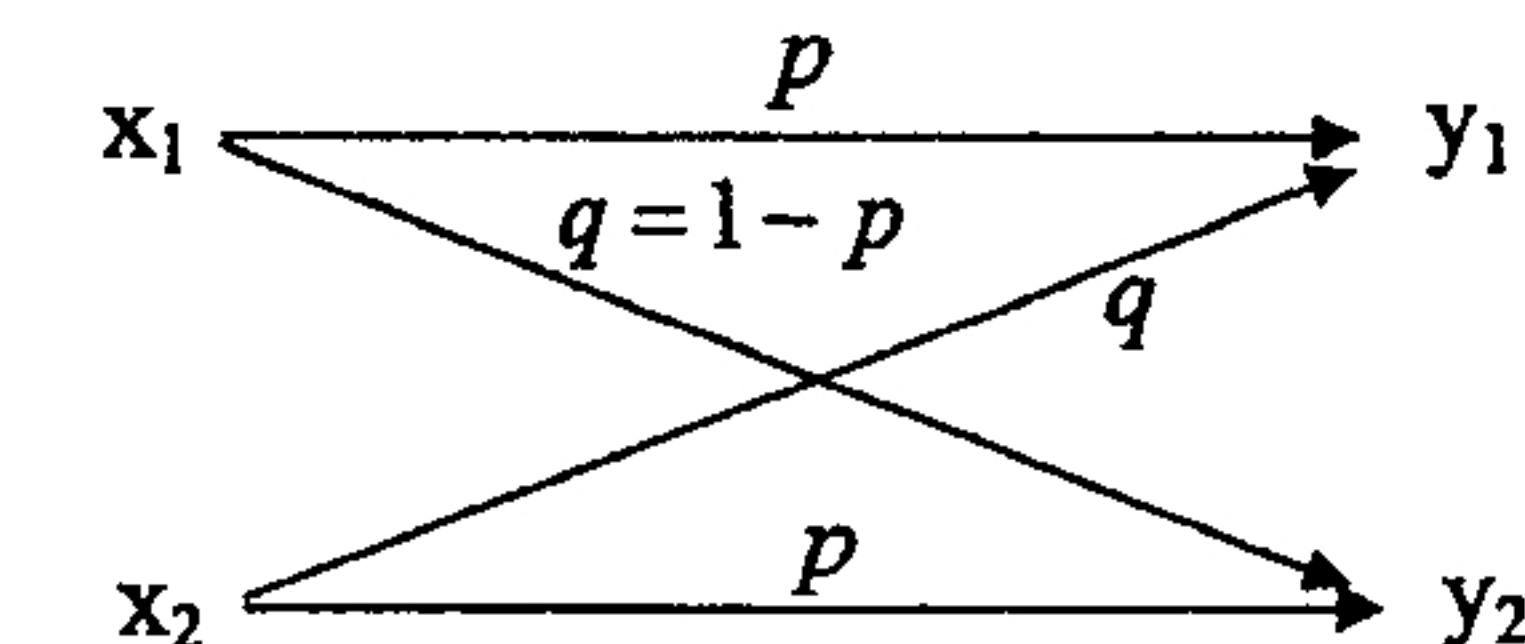


Fig. 2 Binary symmetric channel

注意：背面尚有試題

5. (1) Explain the terms: CDMA and OFDM. Also, give two examples of communication systems using the CDMA and OFDM techniques for transmission, respectively. (10%)
- (2) The OFDM may be viewed as a generalization of M-ary FSK. Judge the rational of this argument. (10%)