

國立臺北科技大學九十五學年度碩士班招生考試

系所組別：1640 電機工程系碩士班丁組

第一節 通訊原理 試題

填准考證號碼

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第一頁 共二頁

注意事項：

1. 本試題共七題，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. The power spectral density $S_x(f)$ and the autocorrelation function $R_x(\tau)$ of a stationary process $x(t)$ form a Fourier-transform pair with τ and f . Please prove it. (15%)
2. (a) Please complete the following table. If the answer does not exist, please give the mark 'X'. (5%)

	Digital or Analog System	Carrier Frequency	Modulation Method	Application Case:
AM	Analog	526k~1606k Hz	AM	AM 廣播電台
FM				
TV				
CATV				
AMPS				
GSM				
DCS				
PHS				
3G				

- (b) Please use a brief introduction to describe 3G, SIP, and Skype. (5%)

3. For each of the following signal, please find the minimum sample frequency such that sampling will not introduce aliasing. (15%)

(a). $x(t) = A \cdot \cos^2(2\pi f_c t)$

(b). $x(t) = A \cdot \cos^2(2\pi f_c t) + B \cdot \sin(4f_c t)$

(c). $x(t) = A \cdot \sin(2\pi f_c t) / t$

(d). $x(t) = A \cdot \cos^2(2\pi f_c t) \cdot \sin(4f_c t)$

4. (a) Please draw the block diagrams of DPSK transmitter and receiver. (8%)

- (b) The bit stream $b_k = \{101010111101010100001111\}$ is to be transmitted using DPSK modulation. Show four different differentially encoded sequences $\{b_k, d_{k-1}, d_k, \text{transmitted phase}\}$ that can represent the data sequence above. (7%)

5. If the linear predictive equation is defined as below:

$$\hat{x}[n] = a_1 \cdot x[n-1] - a_2 \cdot x[n-3], \text{ where the } x[n] \text{ is also defined as below:}$$

$$x[n] = \begin{cases} 1, n=0 \\ 3, n=1 \\ 2, n=2 \\ 4, n=3 \\ 0, \text{others} \end{cases}$$

Please find the optimal value of LPC coefficients (a_1 and a_2). (15%)

6. The generator matrix "G" of linear block code is listed as below:

Please find the parity-check matrix "H" and the syndrome table.

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 0 & 1 \end{bmatrix}; H=?; \text{ syndrome table=?}$$

Moreover, if the received message is $[1\ 0\ 0\ 1\ 1\ 0\ 1\ 0]$. Please find the original and correct 4-bit message. (15%)

注意：背面尚有試題

7. Please use the Viterbi-algorithm to find the optimal path from A to H within Fig.1. The cost value(過路費) is also given in the Fig.1. (15%)

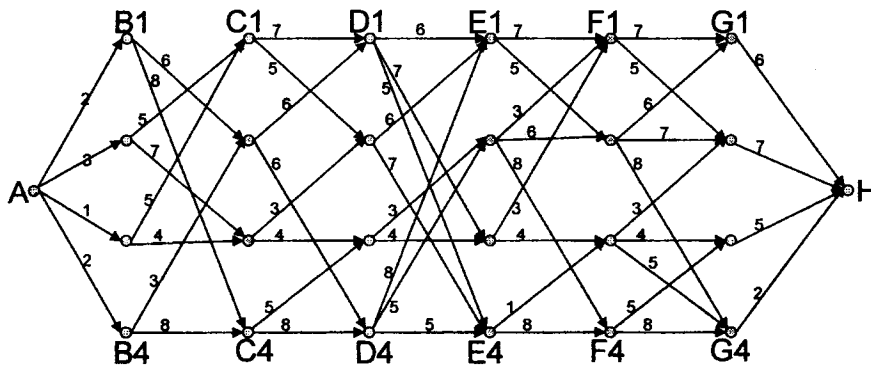


Fig.1