國立臺北科技大學 103 學年度碩士班招生考試

系所組別：2220 電子工程系碩士班乙組

第二節　工程數學　試題

> **注意事項：**
> 1. 本試題共六題，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。

一、

Two events, A_1 and A_2 are the partition of a probability space S. Suppose that probability $P(A_1) = 0.4$, and another event $B \subset S$, satisfies $P(A_1 | B) = 0.6$ and $P(B | A_2) = 0.2$. Find $P(A_2 | B)$.

(20%)

二、

The probability of occurring a "Head" in a coin-tossing experiment is assumed to be 0.6. Let X and Y be the numbers of occurring "Heads" and "Tails" in an experiment of 8 tosses, respectively. Find the variance of $(X-Y)$.

(20%)

三、

There are three random variables X, Y, and Z, where $Z = \min(X, Y)$. Find the expectation $E\{Z\}$, given that the joint probability density function $f_{X,Y}(x, y) = \begin{cases} 1, & 0 \le x \le 1,\ 0 \le y \le 1 \\ 0, & \text{otherwise} \end{cases}$

(15%)

四、

Compute $\int_5^{\infty} e^{-(x-5)^2/18} dx$.

(10%)

五、

Find a matrix **A**, such that $\mathbf{A}^2 - 4\mathbf{A} + 4\mathbf{I} = \begin{bmatrix} 4 & 3 \\ 5 & 6 \end{bmatrix}$, where **I** is the identity matrix.

(20%)

六、

Find the range of a, such that matrix $\begin{bmatrix} 2 & -1 & a \\ -1 & 2 & -1 \\ a & -1 & 2 \end{bmatrix}$ is positive semi-definite.

(15%)