國立臺北科技大學九十九學年度碩士班招生考試
系所組別：2112、2130 電機工程系碩士班甲、丙組
第一節 構武系統 試題（甲組選考）

注意事項：
1. 本次試題共 5 題，配分共 100 分。
2. 務必清楚大題、小題編號作答，不必抄題。
3. 全部答案均須在答題紙之答題欄內作答，否則不予計分。

1. (15%) Find the $K$ value in the following system that will place the closed-loop poles as shown.

2. For the system in the figure,

(a) (10%) Find the transfer function $T(s) = \frac{C(s)}{R(s)}$.
(b) Find the percent overshoot (5%), settling time (5%), and damped frequency of oscillation (5%).

3. For the system in the figure,

(a) (5%) According to the steady-state error concept, find the system type.
(b) (10%) Find the $K$ value to yield 0.1% error in the steady state.
(c) (5%) Use the Routh table to check the stability.

4. For the system in the figure,

(a) (10%) Sketch the root locus.
(b) (10%) Find the $K$ value to yield a stable system with critically damped 2nd-order poles.
(c) (5%) Find the $K$ value to yield a stable system with a pair of 2nd-order poles that have a damping ratio of 0.707.

5. (15%) For the system in the figure, what relationship exists between $b_1$ and $b_2$ to make the system not completely controllable?