

中央警察大學 115 學年度碩士班入學考試試題

所 別：消防科學研究所

科 目：火災科學

作答注意事項：

- 1.本試題共 4 題，每題各占 25 分；共 1 頁。
- 2.不用抄題，可不按題目次序作答，但應書寫題號。
- 3.禁用鉛筆作答，違者不予計分。
- 4.不需使用計算機，可用中文答題。

一、求解下列問題：

(a)A tank contains 1000 liters of water in which initially 100 kilograms of salt is dissolved. Brine runs in a rate of 10 liters per minute, and each liter contains 5 kilograms of dissolved salt. The mixture in the tank is kept uniform by stirring. Brine runs out at 10 liters per minute. Find the amount of salt in the tank at any time t . (15 分)

(b)Find the general solution of this equation.

$$y' = Ay - By^2 \quad (10 \text{ 分})$$

二、(a)Find the eigenvalues and eigenfunctions of the problems.

$$y'' + \lambda y = 0; \quad y(0) = 0, y'(L) = 0 \quad (13 \text{ 分})$$

(b)Find the power series solution of Legendre's equation. λ is a constant.

$$(1 - x^2)y'' - 2xy' + \lambda y = 0 \quad (12 \text{ 分})$$

三、自然發火原因有關氧化熱蓄積而發火之機制為何？並請舉例說明。

四、請說明熱量傳遞方式有哪些？其在火災的各階段扮演何種燃燒機制？