大葉大學 101 學年度 研究所碩士班 招生考試試題紙					
系 所 別	組 別	考 試 科 目 （中 文 名 稱）	考 試 日 期	節 次	備 註
電機工程學系碩士班	乙	工程數學(微分方程、Laplace 轉換)	3 月 17 日	第 一 節	共 2 頁 (10:30～12:00)

說明 1：可否攜帶特殊作答輔助工具：□否 ☑是，考生可使用「不可程式之計算機」(如未註明，一律不准攜帶)

In a linear system shown in Figure 1, given x(t)=u(t-1)-u(t-2), h(t)=e^{-t}u(t), where u(t) is the unit step function, find y(t)

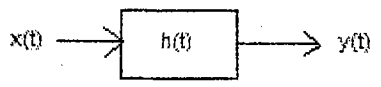

Figure 1.

[1]. By convolution integral (i.e. y(t)=h(t)*x(t) and Y(s)=H(s)X(s)). Then plot y(t). (10%)

[2]. By Laplace transformation. Plot y(t). (20%)

[3]. Derive the differential equation between y and x. (10%)

[4]. Use the differential equation solving (time domain) method and superposition principle to find y(t) using differential equation obtained from [3]. Plot y(t). (20%).

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[5]. Solve the initial-value problem by using time domain method

$$y'' - 10y' + (\pi^2 + 25)y = 0, y(0) = 0, y'(0) = \pi e$$

Where y is a function of t. (15%)

[6]. Solve the same equation in [5] by Laplace transformation method. (15%)

[7]. Prove that y(t) obtained from [5] or [6] satisfies the differential equation in [5]. (10%)