

國立臺北科技大學

九十四學年度製造科技研究所入學考試

微分方程試題

填准考證號碼

第一頁 共一頁

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注意事項：

1. 本試題共五題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

1. Assume that a sphere of ice melts at a rate proportional to its surface area, retaining a spherical shape. Interpret melting as a reduction of volume with respect to time. Determine an expression for the volume of the ice at any time t . (20%)
2. Determine whether the Eq. below is exact or not. If it is exact, find its general solution.
 $1 + e^{(y/x)} - (y/x)e^{(y/x)} + e^{(y/x)}y' = 0, \quad y(1) = -5 \quad (20\%)$
3. 利用參數變化法解非齊次方程式 $y'' + f(x)y' + g(x)y = r(x)$ 之通解。(20%)
設其齊次解為 $y_h = C_1 y_1(x) + C_2 y_2(x)$, 求其特解 $y_p = u(x)y_1(x) + v(x)y_2(x)$
 $u(x) = ?$, $v(x) = ?$ 。
4. Find the orthogonal trajectory curves of the equation $x^2 + (y - C)^2 = C^2$ (20%)
5. Given that Gamma Function $\Gamma(\alpha) = \int_0^{\infty} e^{-t} t^{\alpha-1} dt$
(integration from 0 to infinite ∞).
Calculate the value of $\Gamma(1/2)$. (20%)