

oryg 1-1

國立臺北科技大學

九十三年學年度有機高分子研究所入學考試

工程數學試題

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 7 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. (10%) Solve $(3xy^2 + 2y) dx + (2x^2y + x) dy = 0$
2. (10%) Solve $x^2y'' + x y' + 9y = 0$
3. (20%) Solve $(D^5 - 3D^4 + 3D^3 - D^2)y = x^2 + 2x + 3e^x$
4. (20%) Use the Laplace transformation to solve for $y(t)$ from the simultaneous equations

$$y' + 2y + 6 \int_0^t z dt = -2 u(t)$$

$$y' + z' + z = 0$$

$$y(0) = -5 \text{ and } z(0) = 6$$

5. (10%) Find a unit normal vector to the surface $2x^2 + 4yz - 5z^2 = -10$ at the point $P(3, -1, 2)$.

6. (10%) Find the eigenvalues and eigenvectors of the following matrix

$$\begin{bmatrix} 4 & -5 \\ 1 & -2 \end{bmatrix}$$

7. (20%) (a) Solve the equation

$$\frac{\partial^2 z}{\partial x \partial y} = x^2 y$$

(b) Find the particular solution for which $z(x, 0) = x^2$, $z(1, y) = \cos y$.