

科目：工程數學 適用：土木所－結構與應力組

編號：441

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

本試題
共壹頁
第壹頁1. (20%) Use the power series approach to solve $y'' - xy' + y = 0$.2. (20%) $y_1' = y_1(t)$, $y_2' = y_2(t)$, solve the system of differential equations:

$$2y_1' - 2y_2' - 3y_1 = 0 \text{ ----- (1)}$$

$$2y_1' + 2y_2' + 3y_1 + 8y_2 = 0 \text{ ----- (2)}$$

3. (20%) Solve the linear system of equations

$$x_1 + x_2 + x_3 + x_4 = 2$$

$$2x_1 + 2x_2 + 3x_3 - 2x_4 = 0$$

$$x_1 - 4x_3 - 2x_4 = 0$$

$$x_1 + 3x_2 + 6x_3 - x_4 = -2$$

4. (20%) Express the following function in Fourier series:

$$f(x) = |x|, -\pi \leq x \leq \pi, f(x) = f(x+2\pi)$$

5. (20%) $u = u(x, t)$, solve the PDE $\frac{\partial^2 u}{\partial x^2} = \frac{\partial^2 u}{\partial t^2}$, withboundary conditions: $u(0, t) = 0$, $u(\pi, t) = 0$, andinitial conditions: $u(x, 0) = 0$, $\frac{\partial u(x, 0)}{\partial t} = \sin x$.