大同大學 97 學年度轉學入學考試試題

考試科目:工程數學　　所別:化學工程學系　　第1全頁

註:本次考試 不可以參考自己的書籍及筆記； 不可以使用字典； 不可以使用計算器。
如果題目的條件不足以解題，請自行假設所需條件並說明原因。

1. (15%) Solve y" – 4y' + 3y = –3sin(2x+2); y(–1) = 2, y'(–1) = 2

2. (15%) Solve $x^2y"$ + 3xy' + y = $9x^2$ + 8x + 5

3. (15%) Solve the differential equation by Laplace transform.
$ty''+(4t-2)y'-4y=0; \quad y(0)=1 \quad y'(0)=1$

4. (10%) Find all mathematical functions defined on [-L, L] that are both even and old where L is an arbitrary constant.

5. (15%) Solve a one dimensional heat equation in a bar with length 10 and the heat coefficient k is 2. If the temperature in left side of the bar is 20 degree and 30 degree in right side. What is the temperature distribution function u(x,t) in the bar if the initial temperature profile is q(x).

6. (15%) Solve a one dimensional heat equation in a bar with length π and the heat coefficient k is 10. If the both sides of the bar are insulated and the initial temperature in the bar is
$$\begin{cases} u=35 & \text{if } \pi/4 \le x \le 3\pi/4 \\ u=0 & \text{if } x<\pi/4 \text{ or } x>3\pi/4 \end{cases}$$

7.(15%) Solve the Dirichlet problem for a circular disk with radius π, assume the temperature around the disk is kept at 100 °C in upper half circle ($-\pi < \theta < \pi$).