

大同大學九十四學年度轉學考試試題

系別：化學工程學系

科目：工程數學

全一頁

注意：不可使用計算機、不可參考任何書籍及字典

1. (10%) Solve $e^x \sin(y) - 2x + (e^x \cos(y) + 1)y' = 0$

2. (10%) Solve $(x^2 - 2x)y' + (x^2 - 5x + 4)y = (x^4 - 2x^3)e^{-x}$; $y(3) = 18e^{-3}$

3. (10%) Solve $y'' - 2y' + y = 3x + 25\sin(3x)$

4. (10%) Solve $y'' + 4y = f(t)$; $y(0) = y'(0) = 0$

$$\text{in which } f(t) = \begin{cases} 0 & \text{for } t < 3 \\ t & \text{for } t \geq 3 \end{cases}$$

5. (20%) Consider heat conduction in a bar with insulated ends, hence no energy loss across the ends. Find the temperature distribution if the LEFT HALF of the bar is INITIALLY at temperature A and the RIGHT HALF is kept at temperature zero.

6. (20%) Find a series solution for the Dirichlet problem (Steady state problem) for a disk of the given radius 9 and given boundary data $f(\theta) = 16 \cos(6\theta)$

7. (20%) Solve the problem

$$\frac{\partial^2 y}{\partial t^2} = 16 \frac{\partial^2 y}{\partial x^2} + 2x \quad 0 < x < 2, t > 0$$

$$y(0, t) = y(2, t) = 0 \quad \text{for } t > 0$$

$$y(x, 0) = 0, \quad \frac{\partial y}{\partial t}(x, 0) = 0 \quad \text{for } x > 0$$