

國立暨南國際大學九十三年學年度碩士班研究生入學考試試題

第 1 節工程數學 適用：(地震所 521)

(本試題共 / 頁，第 / 頁)

- 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，並限以藍黑色筆作答。
3. 試題隨卷繳回。(餘請詳閱試場規則)

1. Find the general solution of the differential equation [15%]

$$\frac{dy(x)}{dx} = 8x^3 - 3y$$

2. Find the general solution of the nonhomogeneous differential equation [15%]

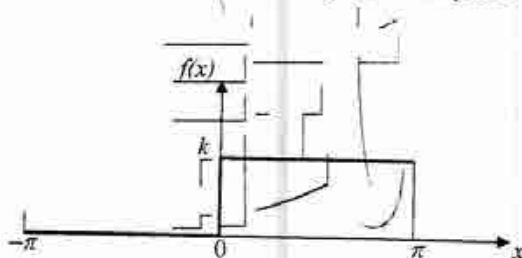
$$\frac{d^2 y(x)}{dx^2} + 2 \frac{dy(x)}{dx} + 2y(x) = \cos(x), \quad y(0) = 1, \quad \frac{dy(0)}{dx} = 2$$

3. Find the eigenvalues and eigenvectors of the matrix $\begin{bmatrix} a & 1 & 0 \\ 1 & a & 1 \\ 0 & 1 & a \end{bmatrix}$ [15%]

4. Find the directional derivative of $f = xyz$ at $P(-1, 1, 3)$ in the direction of $\mathbf{v} = \mathbf{i} - 2\mathbf{j} + 2\mathbf{k}$ [15%]

5. Evaluate the line integral $\int_C 8z^2 ds$, where C is the curve $x = y = 2t^2, z = 1$ for $1 \leq t \leq 2$ [20%]

6. Find the Fourier series of the function $f(x)$ with a period 2π as shown. [20%]



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