

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：(土木所結構 491 土木所水利 501 土木所大地 511) (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%]

$$\frac{d^2 y(x)}{dx^2} - 2 \frac{dy(x)}{dx} + y(x) = 2x + 25 \sin(2x)$$

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

$$x^2 \frac{d^2 y(x)}{dx^2} - 4x \frac{dy(x)}{dx} + 4y(x) = 9x^2 + 6x + 6$$

3. Find the minimum value of $x^2 + 4y^2 + 16z^2$ under the constraint $xy = 1$ and locate the corresponding points. [15%]

4. Evaluate the surface integral $\iint_S f(x) dS$ where $f(x) = 4x^2$ and S is the portion of the plane $x + y + z = 1$ inside the cylinder $x^2 + y^2 = 1$ [20%]

5. Evaluate the integrals $\int_{-\infty}^{\infty} \frac{\cos x}{(x^2 + 4)(x^2 + 9)} dx$ [15%]

6. Solve the following problem [20%]

$$\frac{\partial^2 u(x,t)}{\partial t^2} = c^2 \frac{\partial^2 u(x,t)}{\partial x^2},$$

$$u(0,t) = u(L,t) = 0,$$

$$u(x,0) = x, \quad \frac{\partial u}{\partial t}(x,0) = 0$$

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