

淡江大學九十三年學年度碩士班招生考試試題

系別：水資源及環境工程學系

科目：工程數學

准帶項目請打「○」否則打「×」
簡單型計算機
X

本試題共 / 頁

1. Solve $\frac{\partial u}{\partial t} + 3\frac{\partial u}{\partial x} + 5u = 0,$ (20%)
 $0 < t < \infty, -\infty < x < \infty$
 with IC $u(x, 0) = \cos x$

2. Evaluate (20%)
 $I = \iiint_S (x^3 dydz + x^2 y dzdx + x^2 z dx dy)$
 where S is the closed surface consisting of cylinder $x^2 + y^2 = a^2$
 $(0 \leq z \leq b)$ and the circular disks $z=0$ and $z=b$ ($x^2 + y^2 \leq a^2$)

3. Solve (20%)
 $y_1'' + 10y_1 - 4y_2 = 0$
 $4y_1 + y_2'' + 4y_2 = 0$
 Subject to $y_1(0) = 0, y_1'(0) = 1$
 $y_2(0) = 0, y_2'(0) = -1$

4. Solve $x^2 y'' - 3xy' + 3y = 2x^4 e^x$ (20%)

5. Solve $f(t) = 3t^2 - e^{-t} - \int_0^t f(\tau) e^{t-\tau} d\tau$ for $f(t)$

Hint: $\mathcal{L}\{t^n\} = \frac{n!}{s^{n+1}}$
 $\mathcal{L}\{e^{at}\} = \frac{1}{s-a}$

(20%)