

100 學年度四年制二、三年級轉學生招生考試

四技三年級 電子工程系

第二節 專業科目 (一) 工程數學 試題

第一頁 共一頁

注意事項：

1. 本試題共 10 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. Solve the differential equation $2yy' + 2x = 0$ with initial condition $y(0) = 1$. (10%)
2. Solve the differential equation $y' = y^2 \sin x$ with initial condition $y(0) = 0.5$. (10%)
3. Solve the differential equation $xyy' = 2y^2 + 4x^2$ with initial condition $y(2) = 4$. (10%)
4. Solve the homogeneous differential equation $y'' - 4y' + 4y = 0$ with initial conditions $y(0) = 0$, $y'(0) = -3$. (10%)
5. Solve the homogeneous differential equation $y'' - 6y' + 18y = 0$ with initial conditions $y(0) = 0$, $y'(0) = 6$. (10%)
6. Solve the nonhomogeneous differential equation $y'' - 2y' + y = 2e^x$ with initial conditions $y(0) = 1$, $y'(0) = 1$. (10%)
7. Find the general solution of the Euler-Cauchy equation $x^2y'' - 4xy' + 6y = \frac{42}{x^4}$. (10%)

8. Find the Laplace transforms of the following functions. (10% ; 5% for each)

(a) $f_1(t) = t$

(b) $f_2(t) = e^t$

9. Find the inverse Laplace transforms of the following functions. (10% ; 5% for each)

(a) $F_1(s) = \frac{s}{s^2 + 1}$

(b) $F_2(s) = \frac{s - 2}{s^2 - 4s + 5}$

10. Find the inverse Laplace transform of $\frac{1}{s(s-1)}$. (10%)