

國立高雄應用科技大學
101 學年度碩士班招生考試
電子工程系

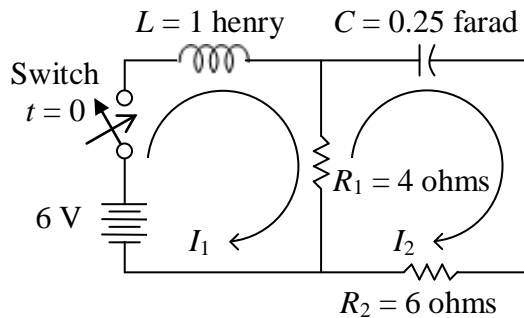
准考證號碼 (考生必須填寫)

工程數學 (甲組)

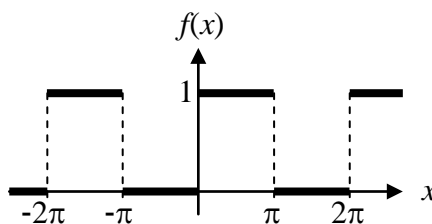
試題 共二頁，第一頁

- 注意：a. 本試題共六題，每題配分如題號後面的百分比，共 100 分。
b. 作答時不必抄題，每題均必須詳細寫出推算算式與過程。
c. 考生作答前請詳閱答案卷之考生注意事項。

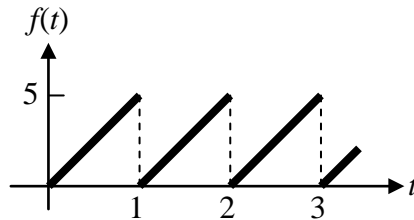
- (20%) Please find the complete solution of $y(t)$ of the following ODE.
 $4y''(t) + 12y'(t) + 9y(t) = 75\sin(3t)$, given $y(0) = 0$ and $y'(0) = -3$.
- (20%) Find the currents $I_1(t)$ and $I_2(t)$ at $t \geq 0$ in the following network. Assume all currents and charges to be zero at $t = 0$, the instant when the switch is closed.



- (15%) Please find the Fourier series of a periodic rectangular wave shown in the following plot, $f(x) = 0$ if $-\pi < x < 0$, 1 if $0 < x < \pi$, and $f(x+2\pi) = f(x)$



4. (15%) Please find the Laplace transform $\mathcal{L}[f(t)]$ of the following periodic sawtooth function of $f(t)$.



5. (15%) Please find $u(x,t)$ of the following P.D.E.

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

6. (15%) A *torus surface* S (Doughnut surface) is shown in the following plot, S is represented by $\mathbf{r}(u,v) = [10+6\cos(v)] \cos(u) \mathbf{i} + [10+6\cos(v)] \sin(u) \mathbf{j} + 6\sin(v) \mathbf{k}$, where $0 \leq u \leq 2\pi$, $0 \leq v \leq 2\pi$, please find the total area of the torus $A(S)$.

