# 國立臺北科技大學產業研發碩士專班 96 年度秋季班招生考試

## 系所組別：120 電力電子產業研發碩士專班

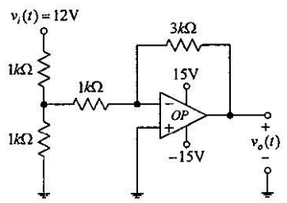
## 第一節 基本電學 試題



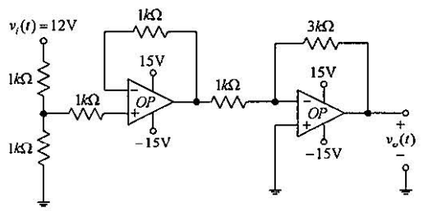
**注意事項：**

1. 本試題共 5 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. Find $v_o(t)$ in the following individual circuits. (10%, 10%)

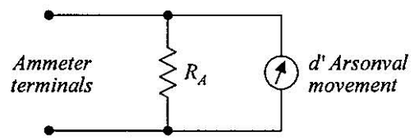



(a)

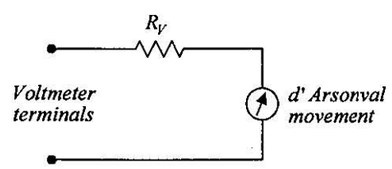



(b)

2. (a) A 50mV, 1mA d'Arsonval movement is to be used in an ammeter with a full-scale reading of 10mA. Determine $R_A$. (10%)




(b) A 50mV, 1mA d'Arsonval movement is to be used in a voltmeter with a full-scale reading of 5V. Determine $R_V$. (10%)

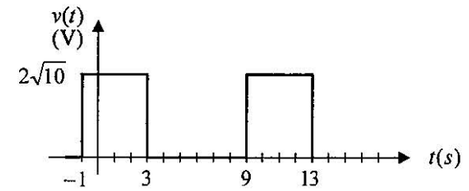





3. (a) If the voltage across the device is
$v(t)=5+10\sin(\omega t+30^\circ)+15\sin(2\omega t+90^\circ)+20\sin(3\omega t+180^\circ)$ V,
and the current flowing through the device is
$i(t)=10+20\cos\omega t+30\cos 2\omega t+40\cos 3\omega t$ A.
Determine the power dissipated in this device. (10%)

(b) A $\frac{480}{\sqrt{3}}V_{rms}$ line feeds two balanced three-phase loads. If two loads are rated as follows.
Load 1: $5\sqrt{5}k$VA at 0.8pf, lagging
Load 2: $10\sqrt{5}k$VA at 0.6pf, leading
Determine the magnitude of the line current from the $\frac{480}{\sqrt{3}}V_{rms}$ source. (10%)

4. Find the rms value of the following periodic waveform $v(t)$. (20%)




5. The two parallel inductors in the following circuit are connected across the terminals of a black box at $t=0$. The resulting voltage $v(t)$ for $t>0$ is known to be $12e^{-t}$V. It is also known that $i_1(0)=2$A and $i_2(0)=4$A. How much energy is trapped in the two inductors? (20%)