# 國立臺北科技大學 101 學年度碩士班招生考試

## 系所組別：2120 電機工程系碩士班乙組

## 第一節　電路學　試題



**注意事項：**

1. 本試題共五題，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. Please find the complete responses $v(t)$ and $i(t)$ and for $t > 0$ for the circuit as below in which u(t) is the unit step function. Assume the circuit is at steady state at $t = 0^-$. 20%

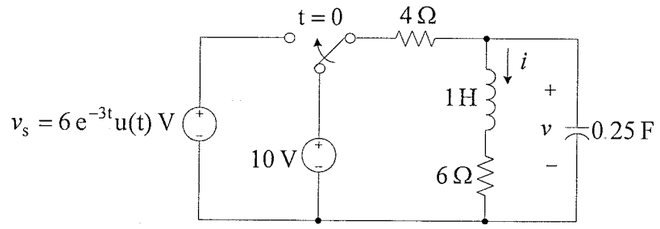


Fig.1

2. Suppose that the circuit shown in Fig. 2 was built using R = 2 kΩ and that the voltage labeled $v$ was measured to be $v = -1.87$ V. Next, the resistor labeled R was changed to R = 5 kΩ, and the voltage $v$ was measured to be $v = -3.0$ V. Finally, the resistor was changed to R = 10 kΩ, and the voltage was measured to be $v = -3.75$ V. How can these measurements be checked to verify that they are consistent? 20%

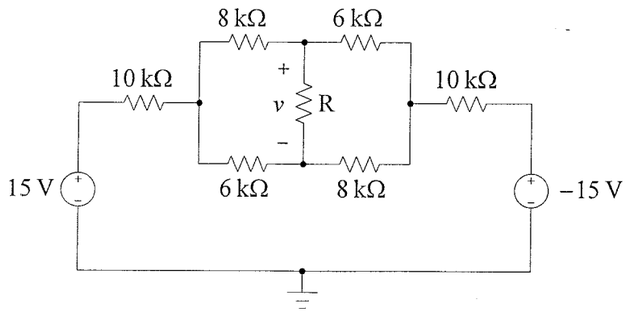


Fig. 2

3. A strain gauge bridge in Fig. 3 has a nominal resistance of R = 120 Ω which is the resistance when the strain is zero. This resistance is expected to increase or decrease by no more than 2 Ω due to strain and the output voltage $v_o$ is required to vary from −10 V to +10 V as ΔR varies from −2 Ω to +2 Ω. If the voltmeter is modeled as an ideal one. Please determine the amplifier gain k, needed to cause $v_o$ to be related to ΔR by

$$v_o = 5 \cdot \Delta R$$

and please verify the proposed solution. 20%

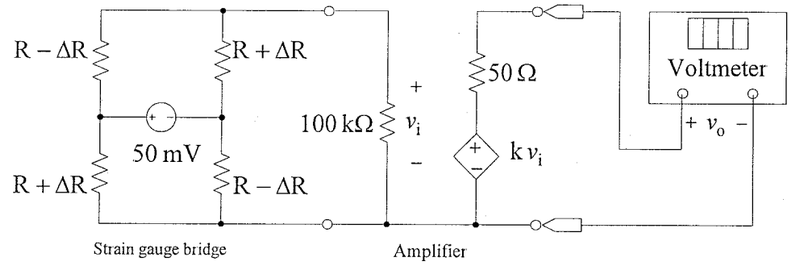


Fig. 3

4. Please find the forced response $v$ in Fig. 4 if

$$v_g = 100 \cos(2000t) \text{ V}$$

20%

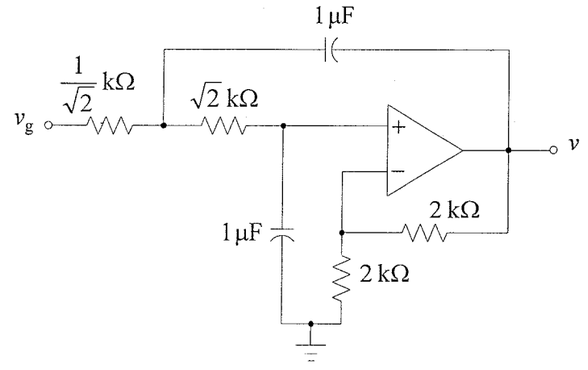


Fig. 4

注意：背面尚有試題

5. Please find the z-parameters for the phasor circuit of Fig. 5. 20%

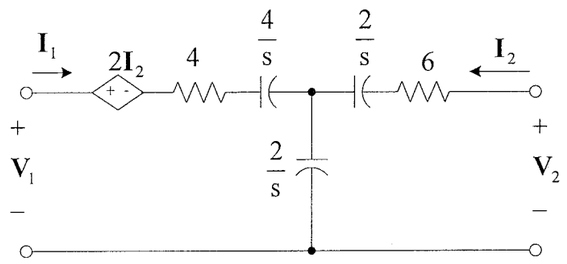


Fig. 5