

國立成功大學

114學年度碩士班招生考試試題

編 號：125

系 所：電機工程學系

科 目：電儀表學

日 期：0210

節 次：第 2 節

注 意：1. 可使用計算機
2. 請於答案卷(卡)作答，於
試題上作答，不予計分。

1. (a) (7%) Please explain the three acquisition (acquire) modes of the standard digital storage oscilloscope in detail and draw their symbols. (b) (8%) Please list three out of four trigger types for the burst mode of the standard function generator and explain their functions in detail.
2. Fig. 1 shows a voltage regulator with an input voltage (V_{in}) of 20 V. The breakdown voltage of the Zener diode (V_Z) is 4 V when its current is 10 mA, and V_Z increases to 4.05 V when its current increases to 20 mA. In addition, $R_2 = 8\text{ k}\Omega$ and $R_3 = 4\text{ k}\Omega$. (a) (7%) Please calculate the dynamic resistance of the Zener diode (i.e., its equivalent resistance at its quiescent operating point). (b) (7%) Please calculate its output voltage (V_o) when the current of the Zener diode is 10 mA. (c) (6%) Please calculate the value of R_1 to make $V_Z=4\text{ V}$.

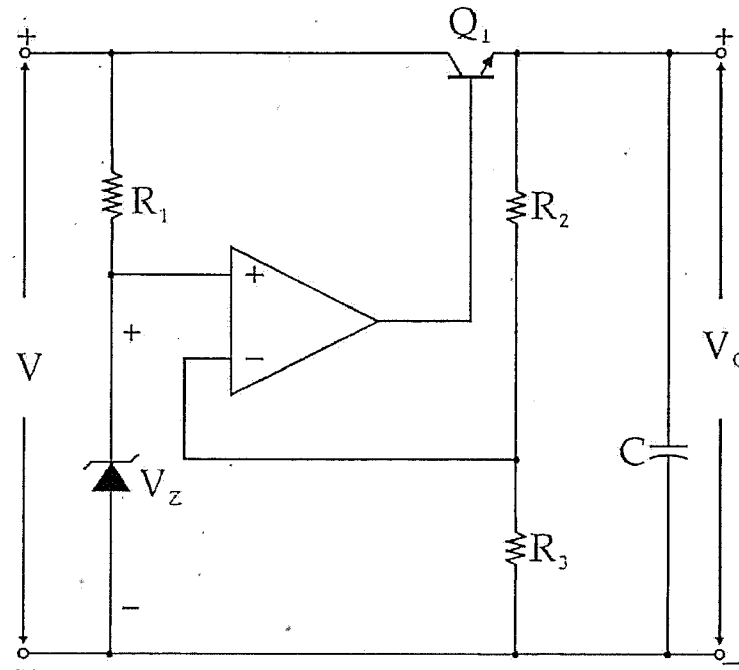


Fig. 1

3. (15%) A digital voltage meter is composed of ADC and a digital display. Please explain how the dual-slope ADC works using Fig. 2.

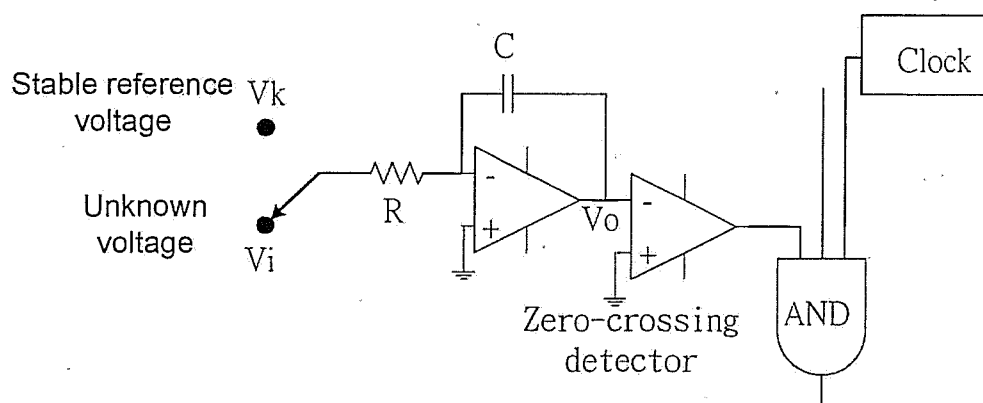


Fig. 2

4. (15%) (a) Express a signal level of 0.8 mV rms in dBm; (b) Find an equivalent signal level of 43 dBm in V_{rms} ; (c) Calculate harmonic mean of this dataset [0 dBm, 10 dBm, 20 dBm] and express it in dBm.

5. (10%) What value of multiplier resistor will make a 0-to-100 μA meter (Ammeter) with an internal resistance of 1200 Ω read 0 to 10V? shall this resistor be connected in series or in shunt?
6. (10%) Use the following rectifier circuit (Fig. 3) to measure 120 V_{rms} (let all $V_D = 0.7 \text{ V}$), calculate PIV (peak inverse voltage) of the diode = _____.

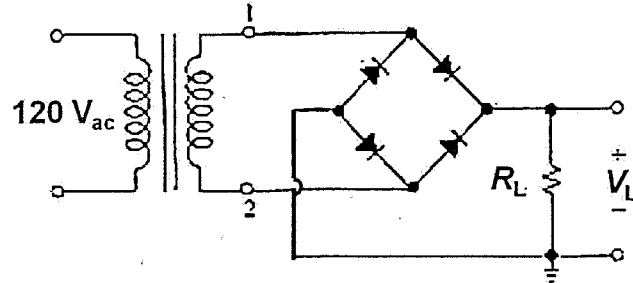


Fig. 3

7. (15%) A Maxwell Bridge at 10 kHz is applied to measure unknown L_s , $R_1 = 200 \Omega$, $R_3 = 1 \text{ k}\Omega$, $R_4 = 500 \Omega$, $C_3 = 10 \mu\text{F}$ as shown in Fig. 4. (a) Is this a frequency-dependent or frequency-independent circuit? (b) Obtain the value of L_s ; (c) Can we find R_s as well?

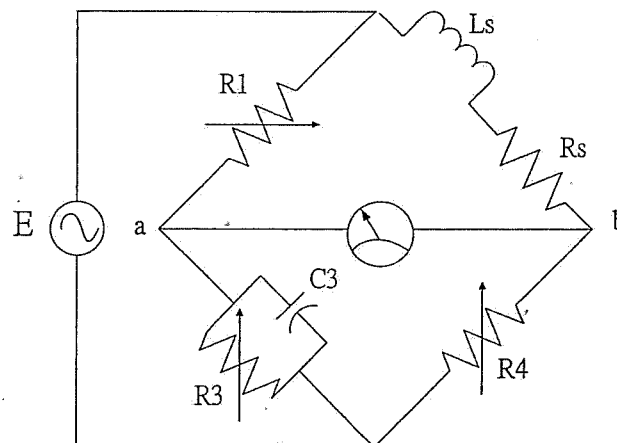


Fig. 4