系所組別： 電機工程學系戊組

考試科目： 電儀表學

※ 考生請注意：本試題 ☑可 □不可 使用計算機

1. (8%)(a) Define and explain source effect and load effect in a power supply system.

   (4%) (b) What are the values of zeta- and zepto- in SI prefixes ?

2. (8%)(a) A set of data is shown below: 13, 96, 7, 12, 10, 9, 96, 8.

   Please find their Arithmetic mean, Median, Mode, and Harmonic mean.

   (5%)(b) What kind of average is the most suitable to describe the data?

3. (12%) Multi-range ohmmeter circuit is shown in Fig.1. We know that the Scale Range of PMMC is $0\sim100$ and range switch is connected to R×1.Find the value of R_X to make the PMMC point to 75.
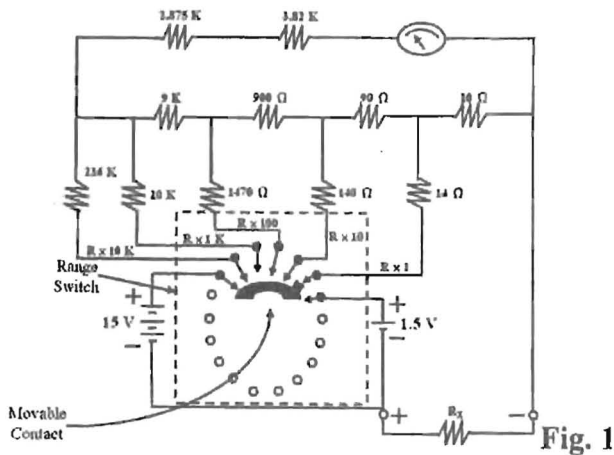

Fig. 1

4. (6%) (a) Explain and describe the difference between the trigger level and delay trigger function in an oscilloscope.

   (7%) (b) The output waveform of the oscilloscope screen will be unstable under the condition of the following figure. How can you adjust to make the waveform stable? Please draw the output waveform on the oscilloscope.

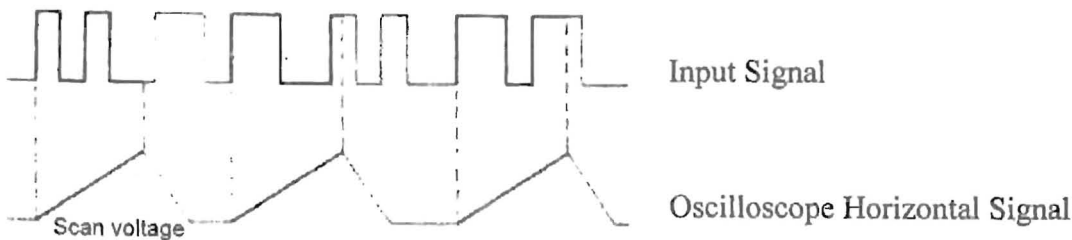Input Signal

Oscilloscope Horizontal Signal

Scan voltage

Fig. 2

5. (10%) Most digital voltage meters are said to have 3½, 4½, or 5½ digits. What does the extra ½ bit mean?

6. (8%) In an eye diagram, what is the relationship between jitter and eye width?

(背面仍有題目,請繼續作答)

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7. (12%) A Wheatstone bridge is shown in Fig. 3, where the supply voltage is 5V, two upper resistors are 20 kΩ, and two lower resistors are 5 kΩ. The input resistance of the galvanometer is 25Ω and its minimal detectable current is 0.5 μA. Determine the minimal detectable change in the measured resistance due to the galvanometer.
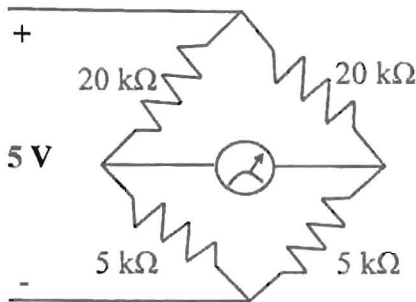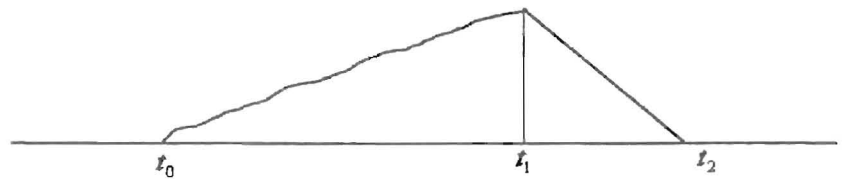

Fig. 3

Fig. 4

8. (8%) A dual-slop ADC has an 8-bit counter, and its input voltage range is denoted as E_{IN}. The output waveform of its integrator during a conversion cycle is shown in Fig. 4. If the input voltage is $\frac{E_{IN}}{4}$, what are the values of counter readings at t_0 and t_2?

9. (7%) (a) What is the definition of the parameter S_{21} (please also explain what a_1, a_2, b_1, and b_2 are)?
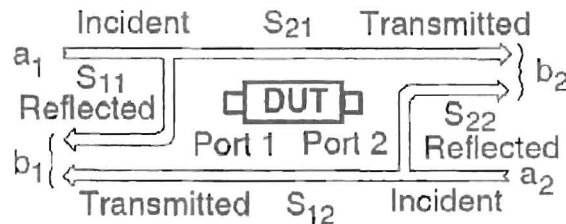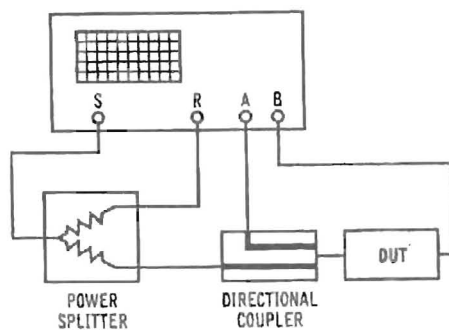

Fig. 5

(5%) (b)Which connection method below can be used to measure reflection coefficient?
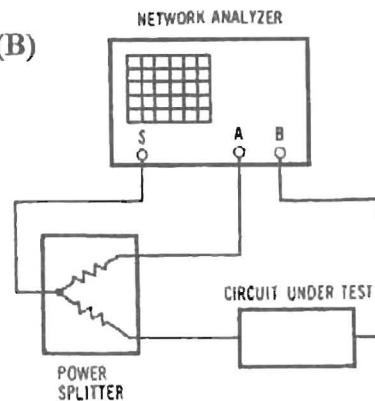
(A)

(B)

Fig. 6