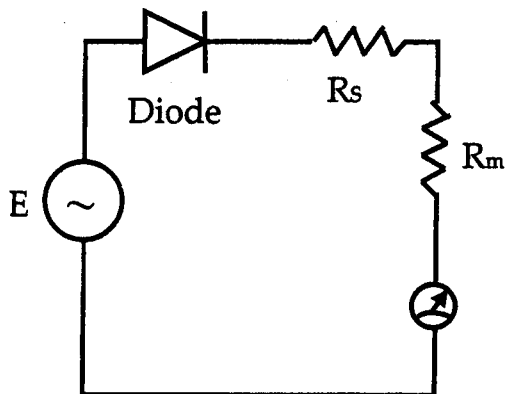


本試題是否可以使用計算機： 可使用， 不可使用（請命題老師勾選）

考試日期：0301，節次：2

1. (8%) A 1 kΩ resistor with 1% accuracy and a 1 μF capacitor with 5% accuracy are used to construct a first-order RC low-pass filter. Please calculate its 3dB frequency in Hz and its absolute error range.
2. (12%) (a) What are the three forces in PMMC meter to influence the movement of the pointer? (6%)
(b) To increase the range/scale of measured current, should a resistor be connected in series or in parallel with the PMMC? (3%) (c) To get a higher current scale, should a resistor with smaller or larger value be used? (3%)
3. (10%) In the figure shown below, $R_m = 2\text{ k}\Omega$, $I_{FSD} = 50\text{ }\mu\text{A}$, V_D (forward voltage of a diode) = 0.7V, find R_s for full-scale 10 Vrms sin wave range



4. (8%) What is jitter? (4%) In an eye diagram, does jitter affect eye width, eye height, or both? (4%)
5. (12%) What are the values of ρ (the magnitude of reflection coefficient) and VSWR (voltage standing wave ratio) for cases of (a) short circuit, (b) open circuit, and (c) $Z_L = 0.5Z_0$, respectively?

(Hint: $\Gamma = \frac{V_{reflected}}{V_{incident}} = \frac{Z_L - Z_0}{Z_L + Z_0} = \rho \angle \phi$, $VSWR = \frac{1 + \rho}{1 - \rho}$)

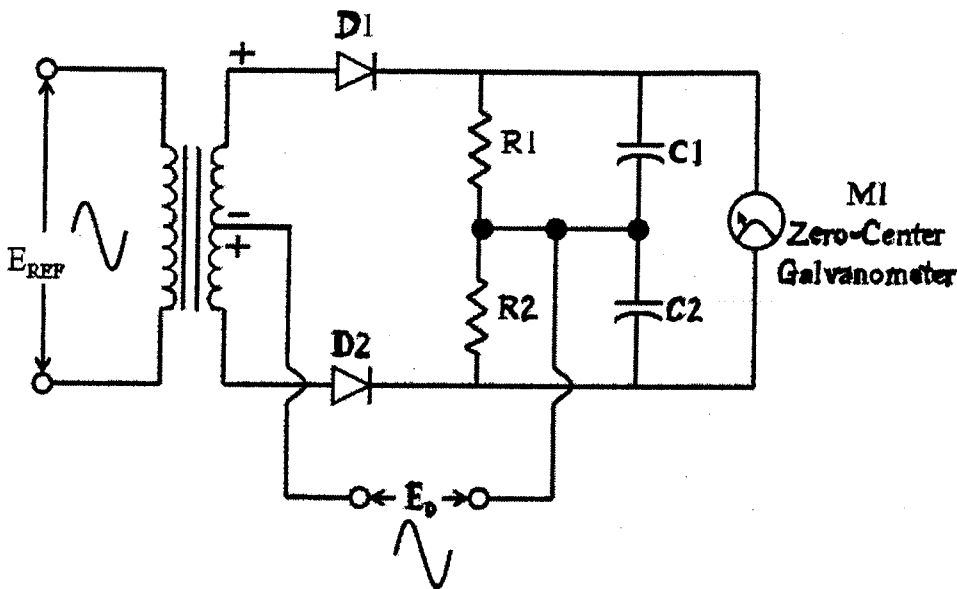
6. (12%) Explain the function and operation in an oscilloscope.
(a) Holdoff Period (6%)
(b) Trigger Level (6%)
7. (10%) (a) Find the period in minutes of a signal if the DCA count is 9078 and the time base frequency is 5 kHz. (5%) (b) Find the percentage of error due to ± 2 count ambiguity at 200 kHz. (5%)

(背面仍有題目,請繼續作答)

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考試日期：0301 · 節次：2

8.(10%) In the figure shown below, explain the operation of the phase detector circuit.



9. (18%) In the figure shown below, resolve signals that differ by 3 kHz and 30 dB for a spectrum analyzer (Bandwidth Selectivity is 11:1 ; The filter skirt is assumed to be straight between 3-dB and 60-dB points for simplicity).

(a) Derive the formula: $-3 \text{ dB} - [(\text{Offset} - \text{BW}_{3\text{dB}}/2)/(\text{BW}_{60\text{dB}}/2 - \text{BW}_{3\text{dB}}/2)] \times \text{Diff}_{60,3\text{dB}}$ (8%)

(b) Can the 1 kHz filter resolve the smaller signal? Calculate and explain it. (10%)

