

國立臺北科技大學

九十七學年第一學期電機系博士班資格考試

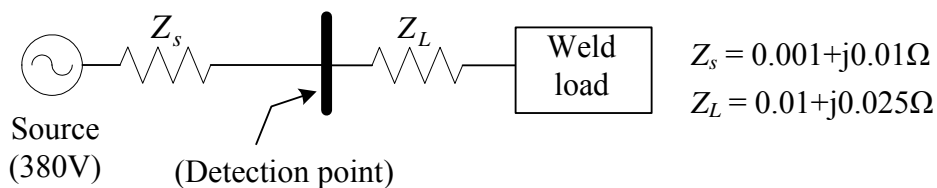
電力系統品質試題

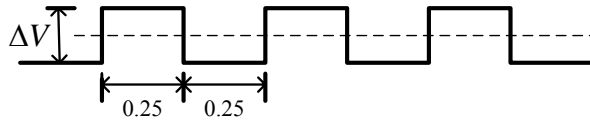
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注意事項：

1. 本試題共【1】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。
4. 考試時間：二小時。

1. (25%) Describe the meanings of the following items
 - (1) Voltage flicker
 - (2) Power factor (PF)
 - (3) Harmonic distortion factor (DF)
 - (4) Total harmonic distortion (THD)
 - (5) Distortion index (DIN)
2. (15%) Explain the reasons to cause the voltage variations and the classify the voltage variations based on the variation type
3. (15%) Explain the reasons to cause the waveform distortions and the strategies to improve the waveform distortions.
4. (15%) Explain the reasons to cause the frequency variation problems and the affections of the frequency variation problems
5. (30%) Consider a system with a weld load as follows





The weld load operated ON and OFF periodically with period 0.5 second where ON and OFF durations are all of 0.25 second, respectively. When operation ON, the equivalent impedance of weld load $Z_w = 0.05 + j0.45\Omega$. The visible perception coefficients for different frequencies are listed in table I.

TABLE I
Visible perception coefficients

f_k	α_k	f_k	α_k
2Hz	0.25	18Hz	0.42
6Hz	0.71	22Hz	0.25
10Hz	1	26Hz	0.1
14Hz	0.83	30Hz	0.03

($\alpha_k = 0, k \geq 8$)

Assume the load currents are neglected by comparison with weld load current. Answer the following question

- (1) The high and low levels difference $\Delta V\%$ at the detection point. (10%)
- (2) The 1st, 3rd, 5th Fourier series coefficients of the square wave $\Delta V(t)$ (10%)
- (3) The $\Delta V_{10\%}$ at the detection point. (10%)