

國立臺北科技大學

九十六學年第二學期電機系博士班資格考試

電力品質試題

填學生證號碼

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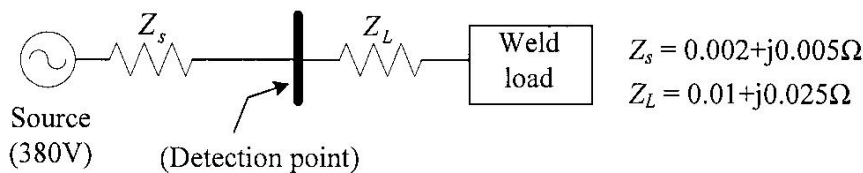
注意事項：

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. (30%) Describe the definitions of the following names

- (1) Harmonic distortion factor (DF)
- (2) Crest factor (CF)
- (3) Power factor (PF)
- (4) Distortion index (DIN)
- (5) Telephone influence factor (TIF)
- (6) Voltage drop rate percentage ($\Delta V_D\%$)

2. (20%) 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

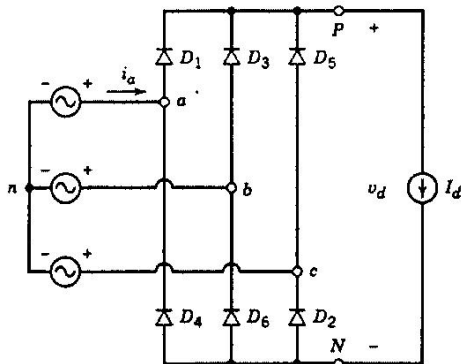
f_k	α_k	f_k	α_k
2Hz	0.25	18Hz	0.42
6Hz	0.71	22Hz	0.25
10Hz	1	26Hz	0.1
14Hz	0.83	30Hz	0.03

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

Answer the following question

- (1) What is the meaning of the voltage flicker? (5%)
- (2) The high and low levels difference $\Delta V\%$ at the detection point. (5%)
- (3) The $\Delta V_{10\%}$ at the detection point. (10%)

3. (20%) A three-phase diode rectifier circuit is shown below

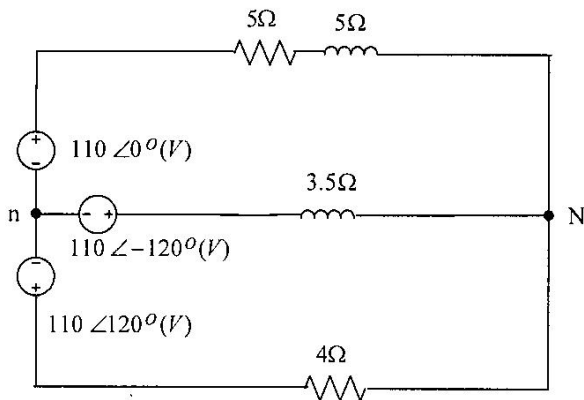


V_a, V_b and V_c are positive sequence balanced three phase voltage source.

Answer the following questions.

- (1) (5%) Plot the current waveform of i_a
- (2) (5%) (Displacement PF) DPF
- (3) (10%) THD%

4. (30%) A three-phase unbalanced circuit is as follows:



- (1) (15%) Obtain the symmetric components $I_0, I_1,$ and I_2 .
- (2) (8%) Obtain the negative-sequence current ratio
- (3) (7%) Obtain the average unbalance current factor of this circuit.