

## 國立臺灣科技大學

## 九十四學年度碩士在職專班招生考試試題

系所組別：電機工程系碩士在職專班甲組

科目：電力工程

## (總分 100 分)

1. (a) 請摘要說明於今年 2 月 16 日起正式生效之「京都議定書」主要目標？ (5%)  
 (b) 請摘要說明再生能源中，風力發電主要之優點及缺點？ (5%)  
 (c) 小型風力發電機並入既設之幅射式配電系統，依系統運轉觀點而言將會產生何種問題並如何克服？ (10%)
2. 請依電力系統觀點說明並闡述  
 (a) 什麼是「電壓閃爍」？其成因、會產生何種問題及如何改善？ (10%)  
 (b) 什麼是「電力諧波」？其成因、會產生何種問題及如何改善？ (10%)
3. Three loads are connected in parallel across a 12.47kV three-phase supply.  
 Load1 : Inductive load, 60kW and 660kVAR  
 Load 2 : Capacitive load, 240kW at 0.8 power factor  
 Load3 : Resistive load of 60kW.  
 (a) Find the total complex power and power factor. (5%)  
 (b) A Y-connected capacitor bank is connected in parallel with the loads. Find the total kVAR and the capacitance per phase in  $\mu F$  to improve the overall power factor to 0.9 lagging. (5%)
4. Use Gauss-Seidel method to find the solution of the following equations:  

$$x_1 + x_1 x_2 = 10$$

$$x_1 + x_2 = 6$$
 with the following initial estimates  
 (a)  $x_1^{(0)} = 1$  and  $x_2^{(0)} = 1$ . (10%)  
 (b)  $x_1^{(0)} = 1$  and  $x_2^{(0)} = 2$ . (15%)  
 Continue the iterations until  $|\Delta x_1^{(k)}|$  and  $|\Delta x_2^{(k)}|$  are less than 0.001.
5. The line-to-line voltages in an unbalanced three-phase supply are  $V_{ab} = 1000\angle 0^\circ$ ,  $V_{bc} = 866.0254\angle -150^\circ$ , and  $V_{ca} = 500\angle 120^\circ$ . Determine the symmetrical components for line and phase voltages, then find the phase voltages  $V_{an}$ ,  $V_{bn}$ , and  $V_{cn}$ . (25%)

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