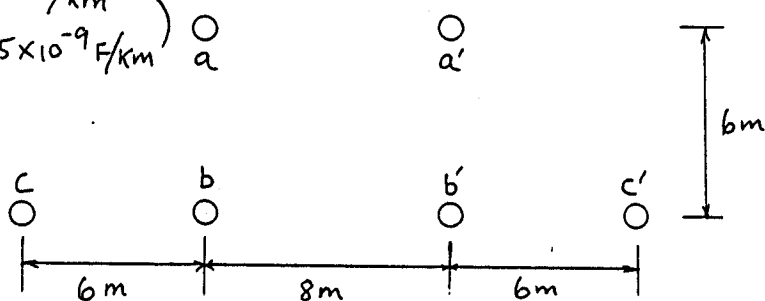


1. 一兩回並聯三相線路 (Parallel-circuit three-phase lines) 佈置如圖所示。導線半徑 $r = 40 \text{ cm}$ 。有完整换位 (Transposition)。

$(\mu = 4\pi \times 10^{-4} \text{ H/km})$
 $(\epsilon(\text{或}k) = 8.85 \times 10^{-9} \text{ F/km})$

(20%)



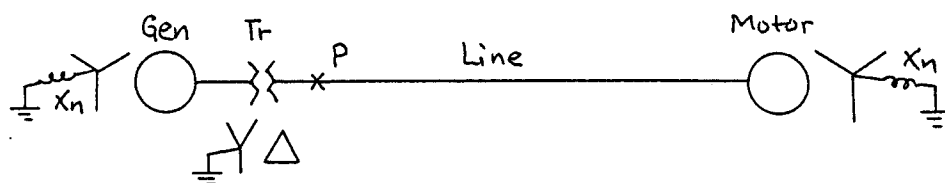
(a) 求每線每公里之電感。

(b) 求每線每公里之電容 (大地之影響可予忽略)。

(註: 利用複導體 (Bundled Conductor) 觀念計算較簡易)

2. 圖二為一三相系統之單線圖。各設備之數據如下 (為已換算至共同基準值之標么值 per unit value):

(20%)



Gen: $X_d' = 0.2$ $X_- (\text{即} X_2) = 0.2$ $X_0 = X_n = 0.05$

Motor: $X_d'' = 0.3$ $X_- (\text{即} X_2) = 0.3$ $X_0 = X_n = 0.05$

Tr: $X = 0.1$

Line: $X_+ = X_- (\text{即} X_1 = X_2) = 0.2$ $X_0 = 0.4$

今於變壓器線路側 P 點發生一線接地故障。故障阻抗 $Z_f = 0.05 \text{ pu}$ 。故障點電壓在故障前之電壓 $|V| = 1 \text{ pu}$ 。

(a) 計算故障點故障電流 I''

(b) 計算故障點在故障時各相之電壓。

3. A 2200-V three-phase Y-connected synchronous motor has a synchronous reactance $X_s = 2.6 \Omega/\text{phase}$. The armature resistance is assumed to be negligible. The input power is 820 kW, while the field excitation is such that the counter EMF is 2800 V. Calculate: (a) the torque angle
(b) the line current
(c) the power factor (20%)
4. Describe the armature reaction effect in a synchronous generator when the load power factor is (a) lagging; (b) leading. What is the effect on the EMF (electromotive force) generated in each case? Explain. (20%)
5. 以簡潔文字 (或公式) 說明下列術語之定義: (20%)
- (a) Medium-length line
 - (b) Voltage regulation
 - (c) Area control error
 - (d) Dynamic stability
 - (e) Power angle curve
 - (f) Cogeneration
 - (g) Demand factor
 - (h) Synchronous condenser
 - (i) Direct energy conversion
 - (j) Load duration curve.