題號： 408
科目： 電力工程
節次： 8

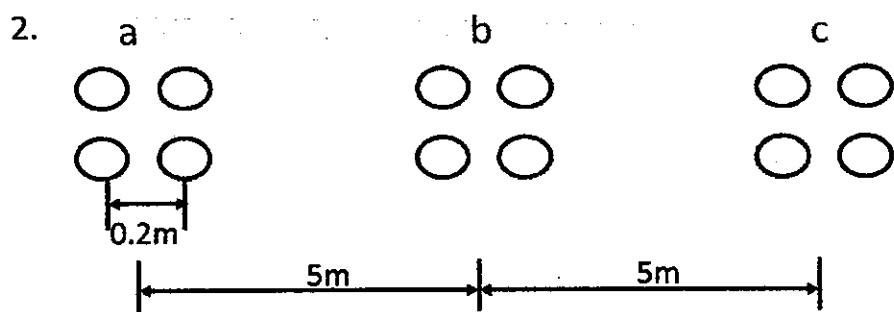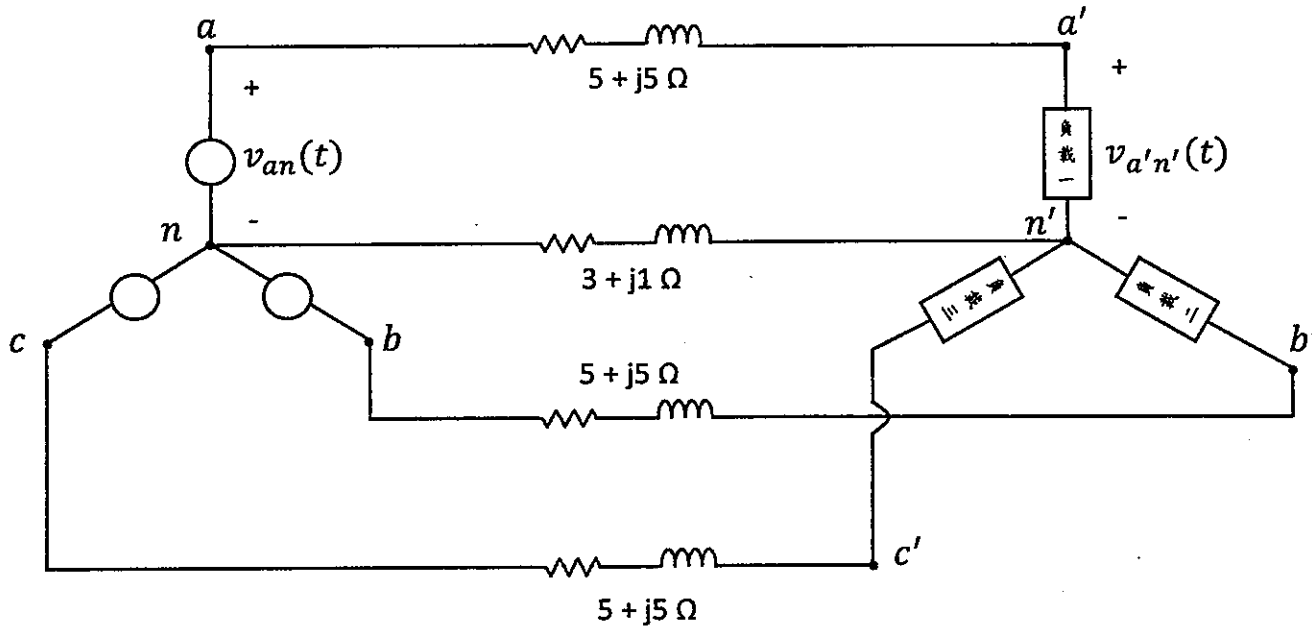國立臺灣大學 106 學年度碩士班招生考試試題

題號：408

共 2 頁之第 1 頁

1. 下圖所示為一三相平衡正序電力系統。假設負載一所消耗之複功率(COMPLEX POWER)為

   $1.76 + j1.32\,\text{MVA}$, $V_{a'n'}(t) = 12700\sqrt{2}\cos 377t$ (伏)。試求 $V_{an}(t)$ 及 $V_{ab}(t)$ 。(12%)

2.

左圖所示為一 60Hz，345KV，三相平衡且完全換位(COMPLETELY TRANSPOSED)之輸電線，每根導線之半徑為 1.5cm。試求每公尺輸電線之每相電感。(10%)

3. 有一單相變壓器，高壓側繞組之匝數為 1000 匝，電阻 $R_1 = 1\Omega$ ，漏電抗 $X_1 = 2\Omega$ 。

   低壓側繞組之匝數為 100 匝，電阻 $R_2 = 0.01\Omega$ ，漏電抗 $X_2 = 0.02\Omega$ 。激磁電流可忽略不計。

   (a) 選定高壓側之基準值為 10KVA，1000V，試計算各阻抗之標么值，並標示於等效電路上。(6%)

   (b) 當低壓側電壓為 100V，所接負載為 8KW，功因為 0.8 落後時，試求高壓側電壓之標么值。(5%)

4. The rotor of a four-pole synchronous generator is rotating at a mechanical speed of 1800 r/min
   (a) What is the frequency of the generated voltage in hertz and in radians per second ? (10%)
   (b) What mechanical speed in revolutions per minute would be required to generate voltage at a frequency of 50 Hz ? (7%)

5. The nameplate on a 450-V 55 HP(Horse Power) 60 Hz four-pole induction motor indicates that its speed at rated load is 1760 r/min. Assume the motor to be operating at rated load.
   (a) What is the slip of the rotor? (10%)
   (b) What is the frequency of the rotor currents? (7%)

見背面

題號： 408
科目： 電力工程
節次： 8

國立臺灣大學 106 學年度碩士班招生考試試題

題號：408
共 2 頁之第 2 頁

6. A boost (step-up) converter has the following specifications: input voltage V_{in} = 12 V, output voltage V_{out} = 50 V, output rated power P_{out} = 120 W, and switching frequency f_{sw} = 100 kHz. The converter is operated at steady-state continuous conduction mode under full load condition.

   (a) Determine the duty ratio. [5]

   (b) Determine the minimum output capacitance so the output voltage ripple ΔV_{out} (peak-to-peak) is 1% of the V_{out}. [5]

   (c) Determine the maximum input current if the inductor is 400μH. [5]

   (d) **Explain** weather the converter is operated in discontinuous mode or not when the output power P_{out} = 25 W. [5]

7. (a) Please **draw** the circuit diagram of the flyback converter with a "RCD snubber" to mitigate the voltage spike caused by the leakage inductor of the transformer. [5]

   (b) **Explain** the operation principle of the RCD snubber [5] and the design guide line for selecting the values for C. [3]

試題隨卷繳回