國 立 臺 北 科 技 大 學

一〇四學年第二學期電機系博士班資格考試

電力系統(大學部) 試題

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注意事項：

1. 本試題共【2】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。

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1. Describe the functions of the following apparatuses in plant or substation:　　(50%)
   (1). Prime mover,　(10%)
   (2). Governor.　(10%)
   (3). Exciter,　(10%)
   (4). Load-tap-changing (LTC) transformer, (10%)
   (5). Capacitor bank,　(10%)

2. A synchronous generator is rated 500MVA, 18kV with synchronous reactance Xd=100% and subtransient reactance Xd"=0.25%. It is operating at rated terminal voltage with output real power 400 MW and reactive power 300 Mvar. The armature resistance is neglected.

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(1) Find the output current magnitude in kA, and the generated voltage (line-to-line internal voltage) magnitude in kV of generator.　(16%)

(2) Draw the phasor diagram to show the phase relationship between terminal voltage, output current and internal voltage; and illustrate the generator operating at normal, under, or over excitations. (17%)

(3) Calculate the line-to-line subtransient internal voltage magnitude in kV, and the subtransient current magnitude in kA when a symmetrical three-phase fault (three-phase short-circuit) occurs at generator terminal point. (17%)