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

電力系統運轉與控制試題

注意事項：

1. 本試題共 ▓▓▓ 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 governor and exciter associated with the frequency control and voltage control of a generator. Use the motion equation of generator rotor to illustrate the relationship between frequency and real power output of generator. (18%)

2. Describe the major objectives of automatic generation control (AGC). Draw a simple block diagram for illustrating AGC implementation at control center via telemetry. (18%)

3. What is the penalty factor of a plant (or a bus)? In practice, for a plant, how does its penalty factor change with the load center moving away from it, and how does the result of economic dispatch will be affected? (18%)

4. Use the block diagram of flow chart to describe the λ-iteration method of solution for the all-thermal dispatching problem neglecting losses. By this method, how to adjust the incremental cost rate (λ) in each iteration? (18%)

5. Two generating units supply power to the load. Both units have same output power limits (100~500MW) and their incremental fuel cost functions can be approached as: **$dF_i/dP_i = a\,P_i + b$ \$/MWh**, where P_i and F_i are output power (MW) and fuel cost (\$/h), respectively, of i-th unit, i=1,2, and **a** and **b** are positive constants with suitable units. The range of incremental fuel cost within output power limit is 5~9\$/MWh. The transmission loss is only determined by the output power of first unit and will reach 50MW when both units have maximum output powers. With economic dispatch considering transmission loss, the output power of first unit is 200MW, find: (1) the penalty factors of both units, (2) the transmission loss, (3) the output power of second unit, (4) the demand power of the load, and (5) the saving in total fuel cost in \$/h for this economic dispatch compared with that of both units with same output power for supplying identical load demand. (28%)*　　*Note:(1)~(4):5%, (5):8%