Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.TECH(EE)/SEM-2/CAM-205B/2011

2011

POWER SYSTEM OPERATION AND CONTROL

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer any *five* questions. 5 × 14 = 70

1. a) Explain the process of Optimal power flow using Linear programming method.

   b) Derive the optimum condition for short-term hydro-thermal scheduling using modern approach method.

   7 + 7

2. a) What is an exciter ? What is its role in AVR loop ? Show the complete block diagram of an AVR loop taking into acount modern static exitation system of the alternator.

   2 + 2 + 6

   b) What is the open loop gain of an AVR loop if the static frequency error is less than 3% ? 4

3. a) Derive the optimum condition for economic load dispatch neglecting network losses. 5

b) Determine the optimum operating condition for dispatch for 3 units delivering a total load of 600 MW without considering generator limits as well as considering generator limit. Data given are :

Unit 1 :

P_{max} = 600 MW, P_{min} = 150 MW

$F_1 (F_1)$ = 550 + 7.7 P_1 + 0.00165$_1^2$ Rs/hr

Unit 2 :

P_{max} = 500 MW, P_{min} = 125 MW

$F_2 (P_2)$ = 300 + 7.88 P_2 + 0.0025 P_2^2 Rs/hr

Unit 3 :

P_{max} = 600 MW, P_{min} = 75 MW

$F_3 (P_3)$ = 80 + 7.99 P_3 + 0.005 P_3^2 Rs/hr. 9

4. A sub-grid has a total capacity 2500 MW. It encounters a load increase of 50 MW if the normal operating load is 1000 MW. Assume inertia constant to be 5 secs and regulation of the generators in the system as 2Hz/pu MW. Find :

i) ALFC loop parameters

ii) static frequency drop

iii) transient response of ALFC loop.

(Assume load frequency dependency to be linear). 14

5. a) What is deregulation ? Discuss the motivational factors which lead to deregulaton and the current electricity market in India. 7

b) Discuss the issues and benefits of deregulation. 7

6. a) Explain Dynamic programming method with the help of a suitable example. 9

b) What is unit commitment ? What are the constraints in UC problem ? 5