POWER SYSTEM OPERATION AND CONTROL

UNIT-I Economic Dispatch Of Thermal Units And Methods Of Solution

The Economic dispatch problem – Thermal dispatching with network Losses are considered – The Lambda – Iteration method – Economic dispatch by Gradient searchmethod

Dynamic programming of Economic Dispatch – Economic dispatch using Dynamic programming – Dynamic programming examples

UNIT-II Transition System Effects

Transmission losses – The B-Matrix formula – Exact method of calculating penalty factors

Unit Commitment

Economic dispatch Vs Unit Commitment – Constraints – Priority list method – Dynamicprogramming solution

UNIT-III Hydro – Thermal Coordination

Introduction – Long range and Short range Hydro-thermal scheduling – Short termHydro-Thermal scheduling problem – A Gradient approach

Interchange Of Power And Energy

Economic interchange between interconnected utilities – Inter utility energy evaluation –Power pools – Transmission effects and Issues: Limitations – Wheeling

UNIT-IV Power System Security

Introduction – Factors effecting power system security – Contingency analysis – Linear sensitivity factors – AC power flow methods – Contingency selection

UNIT-V State Estimation

Introduction – Maximum likelihood Weighted least squares equation – orthogonal Decomposition estimation method – Algorithm

TEXT BOOKS:

1. "Power Generation, Operation and Control " by Allen J. Wood & Bruce F.Woolen berge – John Wiley & sons (Asia) Pvt Ltd.

REFERENCE:

1. "Power System optimization" by D.P.Kothari, J.S.Dhillon, PHI, 2004

MODEL QUESTION PAPER
POWER SYSTEM OPERATION AND CONTROL

Answer any five questions.

Each question carries 20 marks Max. Marks:100

1. (a) Explain in detail the terms: production cost, total efficiency, incremental efficiency and incremental rates with respect to thermal power plants.
   (b) Derive the condition for optimal allocation of total load among units in a thermal station when losses are not neglected.
2. (a) Develop the hydro electric power plant with necessary block diagram.
   (b) The fuel costs of two units are given by
   $C_1 = C_1(P_{G1}) = 1.0 + 25\ P_{G1} + 0.25\ P_{G1}^2$ RS/hr
   $C_2 = C_2(P_{G2}) = 1.5 + 45P_{G2} + 0.2P_{G2}^2$ RS/hr
   If the total demand on the generators is 250 MW . Calculate the economic load scheduling of the two units
3. What is unit commitment problem? Discuss the solution using Dynamic programming
4. (a) With a neat block diagram explain the load frequency control for a single area system.
   (b) Two generators rated 300 MW and 500 MW are operating in parallel. The droop characteristics are 4% and 6% respectively. Assuming that the generators are operating at 50Hz at no load, how a load of 800 MW would be shared. What is the system frequency? Assume free governor action.
5. Two power systems A & B are inter connected by a tie line and have power frequency constants KA and KB per Hz. An increase in load of 500 MW on system 'A' causes a power transfer of 300 MW on system 'A'. When the tie-line is opened the frequency of system 'A' is 49 HZ and of system 'B' 50 HZ. Determine the values of KA and KB, derive the formulae used
6. (a) Explain about clearly about proportional plus integral controller with a load frequency diagram.
   (b) Explain load frequency control and economic dispatch control problem.
7. (a) Write about Weighted least square estimation method.
   (b) Write about the exact method of calculating penalty factors.
8. (a) Explain the factors affecting the power system security?
   (b) Write about the A.C. power flow methods.