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M.Tech.(Pow system.) (Sem.–1)

POWER SYSTEM OPERATION & CONTROL

Subject Code : PEE-501

M.Code : 38806

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**

1) a) Draw and explain characteristics of hydro units. (10)

b) What is penalty factor in economic scheduling and B matrix loss formula? (10)

2. a) Develop an algorithm for solving the optimum dispatch equation of an 'n' bus power system taking into account the effects of system losses. (15)

b) What are the constraints of optimal power flow? (5)

3. a) Explain with a block diagram the model of LFC for an isolated power system. Derive overall transfer function with frequency deviation as output and change in load as input. (12)

b) The following data is available for an isolated area: capacity 5000 MW, frequency 50 Hz, operating load 2500 MW, speed regulation constant 2 Hz/p.u. MW, inertia Constant H=5 seconds, 2% change in load for 1% change in frequency. Determine

i) largest change in step load if steady state frequency is not to change by more than 0.2Hz. (4)

ii) Change in frequency as a function of time after a step change in load. (4)

4. a) What are the constraints in hydro units in unit commitment problem? Compare Economic dispatch and unit commitment. (8)

b) In a power system consisting of two generating plants connected through a transmission line. The plants are required to operate at economical load sharing to supply 600 MW. If the fuel cost characteristics of the plants are : (12)

$C_1 = 0.056P_{G1}^2 + 30\ P_{G1} + 40$; $C_2 = 0.05P_{G1}^2 + 25\ P_{G1} + 50$; Determine the generation supplied by each plant, if the transmission line loss is expressed through

$P_L = 0.015P_{G1}^2 + 0.305P_{G2}^2 + 0.2\ P_{G1}\ P_{G2}$ p.u. Determine the optimal power generation if X =40Rs/Mwh.

Use participation factor method to calculate the dispatch for a load of 900 MW.

5. How do you model tie-line power flow in two area system using analytical technique? Distinguish between load frequency control and economic load dispatch control with neat block diagram. (20)

6. A two plant system having a steam plant near the load centre and hydro plant at a remote location. The load is 4000MW for 16hrs a day. The characteristics of the units are

$C1 = 0.075\ P_T^2 + 40P_T + 100$

$W_2 = 0.0025\ P_H^2 + 0.5P_H$,

$B_{22} = 0.001MW^{-1}$

Find the generation schedule, daily water used by the hydro plant and daily operating cost of thermal plant for $\gamma_j = 82.5\ Rs/m^3$ –hr. (20)

7. Explain short term Hydro-Thermal energy scheduling considering losses with lambda-gamma method. (20)

8. a) Types of interchange between interconnected utilities. (10)

   b) Explain technical and structural issues of transmission. (10)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.