

M.TECH FIRST SEMESTER
EEPC1T3 POWER SYSTEM OPERATION AND CONTROL Credits: 4

Lecture: 4 periods/week

Internal assessment: 30 marks
Semester end examination: 70 marks

Objective:

The subject deals with economic operation of power systems, unit commitment problem and solution to UC problem by various approaches. It emphasizes on single area and two area load frequency control generation with limited energy supply, inter change evaluation and power pools economy interchange.

Learning outcomes: After completing this course, student will be able to

1. Understand concept of UC problem and its various solution methodologies
2. Analyze the importance of maintaining frequency in power system operation.
3. Get concept of optimal load frequency control
4. Understand the power pools operation and their economic issues

Unit 1 : Unit commitment problem : Introductions to UCP, thermal & Hydral constraints in Unit commitment : Priority list scheme method, unit commitment problem solution by priority list scheme method,

Unit 2 : Unit commitment problem solutions by Dynamic programming Approach. Introduction, advantages of DP method over priority list scheme, Back word DP approach, forward DP approach algorithm and their flow charts solution UCP using Dynamic program method.

Unit 3 : Load Frequency Control-I : Necessity of keeping frequency constant. Definition of control area, single area control, Block diagram representation of an isolated Power System, Steady State analysis, Dynamic response-Uncontrolled case.

Unit 4 : Proportional plus Integral control of single area and its block diagram representation, steady state response, load frequency control and Economic dispatch control.

Unit 5 : Load Frequency Control-II : Load frequency control of 2-area system : uncontrolled case and controlled case, tie-time bias control.

Unit 6 : Optimal LF control line steady state representation, performance Index and optimal parameter adjustment.

Unit 7 : Generation with limited Energy supply : Take-or-pay fuel supply contract, composite generation production cost function. Solution by gradient search techniques, Hard limits and slack variables, Fuel scheduling by linear programming.

Unit 8 : Interchange Evaluation and Power Pools Economy Interchange, Economy interchange Evaluation, Interchange Evaluation with unit commitment, Multiple Interchange contracts. After-the-fact production costing, Transmission Losses in transaction Evaluation, other types of Interchange, power pools.

Reference Books :

1. Electrical Energy Systems Theory - by O.I.Elgerd, Tata Mc Graw-Hill Publishing Company Ltd, 2nd edition.
2. Power System Analysis by Hadi Saadat – Tata Mc Graw Hill Publications
3. Power Generation, Operation and Control - by A.J.Wood and B.F.Wollenberg,John wiley & sons Inc. 1984.
4. Modern Power System Analysis - by I.J.Nagrath & D.P.Kothari, Tata Mc Graw-Hill Publishing Company ltd, 2nd edition.