MARIA COLLEGE OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF EEE

POWER SYSTEM OPERATION AND CONTROL

UNIT-1

1. Explain the need for voltage and frequency regulation in power system.

2. What are the components of speed governor system of an alternator? Derive a transfer function and sketch a block diagram.

3. Draw and explain the basic P-f and Q-V control loops.

4. Briefly explain about the plant level and the system level controls.

5. Briefly discuss the classification of loads and list out the important characteristics of various types of loads.

6. (a) Briefly explain the overview of system operation.
(b) Explain about the Static characteristics of various loads

UNIT-2

1. Discuss in detail the dynamic response of a single area system, without integral control, following a step load disturbance.

2. Derive the transfer function of an uncontrolled load frequency control of a single area system and derive the expression for static error following a step load change.

3. Draw the transfer function block diagram for a two area system provided with governor control and obtain the steady state frequency error following a step load change in both the areas.

UNIT-3

1. (a) Discuss generation and absorption of Reactive Power
(b) Explain how voltage control can be effected by injection of Reactive Power

2. (a) Draw the composite SVS power system characteristics
(b) What are the applications of SVS

3. Explain different types of static VAR compensators with a phasor diagram

4. A 3Φ, 230 kV transmission line having the following parameters operates at no-load. R=20Ω, X= 80 Ω, B= 4x10-4 mho. If the receiving end voltage is 210kV find the sending end voltage representing the transmission line as π model.

UNIT-4

1. (a) Explain briefly the constraints on unit commitment problem.
(b) What is spinning reserve and does this reserve help in operating a power system efficiently?

2. Explain Priority list method using full load average production cost. State the merits and demerits.

3. Explain with a neat flowchart the procedure for finding the solution for unit commitment problems using forward DP method.

4. There are three thermal generating units which can be committed to take the system load. The fuel cost data and generation operating unit data are given below:

$F1 = 392.7 + 5.544 P_1 + 0.001093 P_1^2$

$F2 = 217 + 5.495 P_2 + 0.001358 P_2^2$

$F3 = 65.5 + 6.695 P_3 + 0.004049 P_3^2$, P_1, P_2, P_3 in MW

Generation limits : $150 \le P_1 \le 600$ MW
$100 \le P_2 \le 400$ MW
$50 \le P_3 \le 200$ MW

There are no other constraints on system operation. Obtain an optimum unit commitment table. Adopt Brute force enumeration technique. Show the details of economic schedule and the component and total costs of operation for each feasible combination of units for the load level of 900 MW.

5. The input –output curve characteristics of three units are:

$F1=750+6.49 P_{G1} +0.0035P_{G1}^2$

$F2=870+5.75 P_{G2} +0.0015P_{G2}^2$

$F3=620+8.56 P_{G3} +0.001P_{G3}^2$
The fuel cost of unit 1, 2, 3 is 1.0 Rs / Mbtu. Total load is 800 MW. Use participation factor method to calculate the dispatch for a load is increased to 880 MW?

UNIT-5

1. Explain the different system operating states .

2. Discuss about automatic substation control using SCADA.

3. Explain about SCADA configuration.

4. Briefly discuss the various functions of energy control centre.

5. Explain the hardware components and functional aspects of SCADA system using a fundamental block diagram.

6. Explain the various controls for secure operation.

7. Explain briefly how the system states are continuously monitored and controlled.