Code No: **R1641023** **R16** **Set No. 1**

IV B.Tech I Semester Supplementary Examinations, July/Aug – 2021

POWER SYSTEM OPERATION AND CONTROL

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any FOUR questions from Part-B

*****

PART–A *(14 Marks)*

1. a) Define incremental fuel and production costs. [2]
   b) The optimization problem in the case of a hydro thermal system is referred to as a dynamic problem. Why is it so? [3]
   c) What do you mean by commitment of a unit? [3]
   d) What is meant by single area power system? [2]
   e) What is Tie-line bias control? [2]
   f) What is the need of compensation? [2]

PART–B *(4x14 = 56 Marks)*

2. a) Derive the expressions for loss coefficients with necessary diagram. [7]
   b) Two power plants of total capacity 200 MW are scheduled for operation to supply total system load of 120 MW. Determine the optimum load scheduling. The following are the incremental cost characteristics and the generator constraints.

$$\frac{dC_1}{dP_{G1}} = 20 + 0.16\,P_{G1}, \quad 25 \le P_{G1} \le 120$$

$$\frac{dC_2}{dP_{G2}} = 30 + 0.20\,P_{G2}, \quad 35 \le P_{G3} \le 100$$

[7]

3. a) How is optimal generation scheduling of hydrothermal system stated and solved? [7]
   b) Obtain the mathematical model of pumped storage hydro plant model. [7]

4. a) Obtain the cost function formulation. [7]
   b) Explain the Dynamic programming method for unit commitment problem. [7]

5. a) Obtain the mathematical modeling of speed governing system with neat diagram. [7]
   b) A 150MVA generator operates on full load at a frequency of 60Hz. the load is suddenly increased to 20MW. Due to time lag in governing system the steam value begins to open after 0.3 sec. Find the change in frequency that occurs in time. Given H= 3.5 kW-sec/kVA of generator capacity. [7]

6. Derive the expression for incremental tie line power of an area in an uncontrolled two area system under dynamic state for a step load change in either area. [14]

7. a) Compare different types of compensating equipment for transmission systems. [7]
   b) What are the various types of basic FACTS controller? Discuss them. [7]