$$\frac{dC_1}{d\text{PG}_1} = 30 + 0.15\text{PG}_1 \quad \text{Rs. Per MWh}$$

$$25 \leq \text{PG}_1 \geq 125$$

$$\frac{dC_2}{d\text{PG}_2} = 30 + 0.25\text{PG}_2 \quad \text{Rs. Per MWh}$$

$$25 \leq \text{PG}_2 \geq 125$$

$$\frac{dC_3}{d\text{PG}_3} = 30 + 0.10\text{PG}_3 \quad \text{Rs. Per MWh}$$

$$25 \leq \text{PG}_3 \geq 125$$

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B.Tech. EXAMINATION, May 2017

(Seventh Semester)

(Old Scheme) (Re-appear Only)

EE-411

POWER SYSTEM OPERATION AND CONTROL

Time : 3 *Hours*] [*Maximum Marks :* 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt any *Five* questions. Each question carries equal marks.

1. Draw the complete block diagram of Load frequency Control of an isolated power system. Obtain the steady state change in frequency for unit step change in demand power as well as in speed governor setting. Hence draw the load frequency characteristics of speed governor system.

2. Two generators rated 200 MW and 400 MW are operating in parallel. The droop characteristics of their governors are 4% and 5% respectively from no load to full load. The speed changers are so set that the generators operate at 50 HZ sharing the full load of 600 MW in the ratio of their ratings. If the load reduces to 400 MW, how will it be shared among the generators and what will be the system frequency ? Assume free governor operation. The speed changers of the governors are reset so that the load of 400 MW is shared among the generators at 50 Hz in the ratio of their ratings. What are the no load frequencies of the generators ?

3. Define stability, steady state stability, transient stability and dynamic stability. Develop the swing equation for generator connected to power system network.

4. Perform the dynamic analysis for the small oscillation in an unregulated power system with and without the damper winding's effect.

5. What are the various types of excitation systems ? Draw the block diagram of IEEE type-1 Excitation System and develop it state space mode.

6. Describe the concept of voltage stability through PV and PQ curves. Derive the equation for PV for various factors.

7. Derive the transmission loss formula.

8. Three power plants of total capacity 425 MW are scheduled for operation to supply total system load of 300 MW. Find the optimum load scheduling if the plants have the following incremental cost characteristics and the generator constraints.