Code No: **R41024** **R10** **Set No. 1**

IV B.Tech I Semester Supplementary Examinations, October/November- 2019

POWER SYSTEM OPERATION AND CONTROL

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1 a) What are the characteristics of steam unit? Explain. [8]

b) A constant load of 250 MW is supplied by two 200 MW generators, for which the respective incremental fuel costs are :

$$\frac{dC_1}{dP_{G_1}} = 0.10\ P_{G_1} + 25.0$$

$$\frac{dC_2}{dP_{G_2}} = 0.12\ P_{G_2} + 10.0$$

with power P_G in MW and costs C in Rs/hr.

Determine (i) The most economical division of load between the generators. (ii) The saving in Rs/ day there by obtained compared to equal load sharing between two generators. [7]

2 a) Derive the condition for optimum operation of a power system for 'n' units with line losses are considered. [8]

b) On a system consisting of two generating plants the incremental costs in Rs/ MWh with P_{G1} and P_{G2} in MW are

$$\frac{dC_1}{dP_{G1}} = 0.007P_{G1} + 9.5 \text{ and } \frac{dC_2}{dP_{G2}} = 0.0011P_{G2} + 15$$

The system is operating on economic dispatch with $P_{G1} = P_{G2} = 250$ MW and $\frac{\partial P_L}{\partial P_{G2}} = 0.25$. Find the penalty factor of plant-1. [7]

3 Derive the condition for optimality of short term hydro- thermal scheduling problem? State any assumptions considered. [15]

4 a) What is the need of solution methods for unit commitment? [6]

b) Explain the dynamic programming for unit commitment? State any assumptions considered. [9]

5 a) Obtain mathematical modeling of speed governing system with necessary block diagram. [8]

b) With first order approximation explain the dynamic response of an isolated area for LFC. [7]

6 a) Obtain the block diagram of two area load frequency control system [9]
b) What is meant by tie-line bias control in two area LFC [6]

7 Draw the block diagram of single area LFC system with integral control and prove that steady state change in frequency is zero. [15]

8 a) Contrast between different types of compensating equipment for transmission system. [8]
b) What is the need of FACTS devices in power systems [7]