Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–VII EXAMINATION – WINTER 2015

Subject Code:X70902 **Date:11/12/2015**

Subject Name: Interconnected Power Systems

Time: 10:30pm to 01:00pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Symbols have their usual meanings**

Q.1

(a) Explain the procedure for formulating Y_{BUS} matrix, giving suitable illustration [7]

(b) Discuss tie line load bias method of frequency control [7]

Q.2

(a) Explain equal area criteria of stability [7]

(b) Derive swing equation of synchronous machine [7]

OR

(b) Derive the formula for most economic dispatch neglecting transmission losses [7]

Q.3

(a) A synchronous machine is feeding power to an infinite bus. Suddenly the mechanical input to the system is increased. Discuss the stability of the system as a function of δ. [6]

(b) Explain point by point method of stability. State the assumptions made [8]

OR

Q.3

(a) In a system consisting of two generating units the incremental costs are [7]

$$\frac{dF_1}{dP_1} = 0.16P_1 + 32 \text{ Rw/MWh}, \quad \frac{dF_2}{dP_2} = 0.24P_2 + 36 \text{ Rs/MWh}$$

The system is operating on economic dispatch with $P_1 = P_2 = 100$ MW and $\frac{dP_L}{dP_2} = 0.2$. Find the penalty factor of plant 1

(b) A 50 Hz synchronous generator is connected to an infinite bus through a line. The p.u. reactances of the generator and line are j0.3 and j0.2 p.u. respectively. The generator voltage is 1.1 p.u. and infinite bus is 1 p.u. The inertia constant of the generator is 3 MW-sec/MVA. Determine the frequency of natural natural oscillations if the generator is loaded to (i) 60% and (ii) 75% of its maximum power transfer capability [7]

Q.4

(a) Compare NR and GS method of load flow [8]

(b) Explain classification of buses [6]

OR

Q.4

(a) Discuss Z_{BUS} building algorithm in detail [9]

(b) Two generators rated 200 MW and 400 MW are operating in parallel. The droop characteristics of their generators are 4% and 5% respectively from no load to full load. Assuming that generators are operating at 50 Hz at no load, how would a load of 600 MW be shared between them? What will be the system frequency at this load? Assume free governor operation. [5]

Q.5

(a) Explain Frequency control by hydraulic servomotor, fly balls and linkage mechanism [7]

(b) Explain cascade tripping and network islanding [7]

OR

Q.5

(a) Discuss the methods of improving power system stability [7]

(b) Explain hydrothermal co-ordination [7]