Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2014

Subject code: 710701N **Date: 13-06-2014**

Subject Name: Power System Modeling and Simulation

Time: 02:30 pm - 05:00 pm **Total Marks: 70**

Instructions:

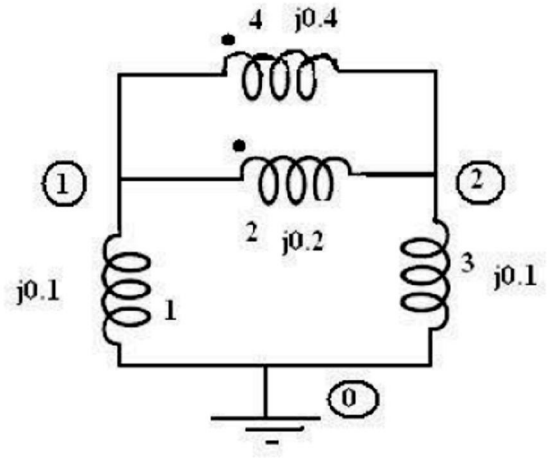
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Prove following relations : $Y_{bus} = A\,[y]\,A^T$, using primitive admittance matrix and network topology. **07**

(b) Provide bus classification stating importance of each in load flow study. **07**

Q.2 **(a)** Explicate any one Numerical integration algorithm used to solve differential equations. Relate their relative performance. **07**

(b) For a given network, considering node-0 as reference node, find bus impedance matrix using Z_{bus} algorithm. Elements 2 & 4 are mutually coupled having mutual reactance j 0.15 per unit. Add elements as per order given by number shown in figure below. **07**



OR

(b) List all the assumptions made in short circuit (fault) analysis. And justify each of them. Also state applications of short circuit analysis. **07**

Q.3 **(a)** Draw the flowchart for FDLF method for n bus power system having both PV and PQ buses. State and explain all assumptions made in decoupled load flow method to obtain FDLF algorithm. **07**

(b) Explain "Approximate load flow method" or "Direct load flow method" for n bus system. State all the assumption made to derive equations and justify each of them. **07**

OR

Q.3 **(a)** Explain following network matrices : Basic incidence matrix (A), Basic Loop matrix (B), Basic cutest matrix (C) and Branch Path Incidence matrix (K). **07**

	(b)	How Z_{bus} algorithm is used to add Link in to the existing partial network. Derive all the equations used in the algorithm. The added element may be mutual coupled and may be connected to a reference node.	**07**
Q.4	**(a)**	Explain optimal dispatch and secure dispatch. With suitable example.	**07**
	(b)	Explain Linear Sensitivity factors, Generation shift factor and line outage distribution factor for Power System Security.	**07**

OR

Q.4	**(a)**	What is State Estimation? State application of State Estimation in Power System.	**07**
	(b)	Write short note on Maximum Likehood Weighted Least Squares Estimation.	**07**
Q.5	**(a)**	Explain sparsity techniques and its benefits. Explain any one method to store sparse matrix in computer.	**07**
	(b)	Explain performance index (PI). How it is useful for contingency selection?	**07**

OR

Q.5	**(a)**	What is Network Observability and Pseudo measurements? Explain in detail	**07**
	(b)	What is significance of Bewleys Lattice diagram. Explain with neat sketch. Give information obtained from Bewleys Lattice diagram.	**07**

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