

GUJARAT TECHNOLOGICAL UNIVERSITY
ME Semester –I Examination Feb. - 2012

Subject code: 710701N

Date: 11/02/2012

Subject Name: Power System Modeling & Simulation

Time: 10.30 am – 01.00 pm

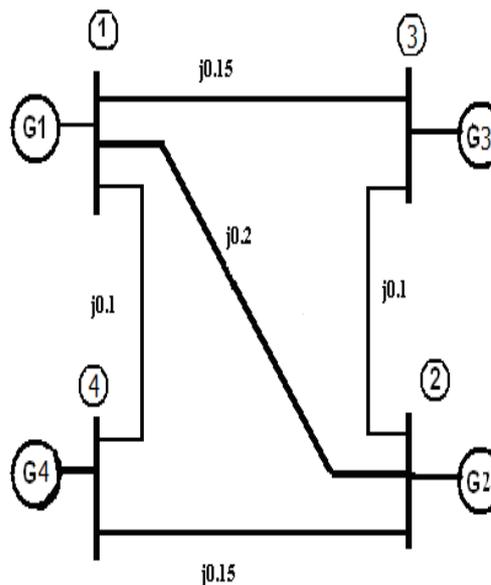
Total Marks: 70

Instructions:

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

- Q.1** (a) Define basic incidence matrix (A) and primitive admittance matrix (y). Also derive bus admittance matrix equation. i.e. $Y_{bus} = A [y] A^T$ **07**
- (b) How Zbus algorithm is used to add Branch element in to the existing partial network. Derive all the equations used in algorithm. The added element may be mutual coupled and may be connected to a reference node. **07**
- Q.2** (a) Define Ybus. Develop algorithm or flowchart to form a Ybus matrix of given 'n' bus power system using direct inspection method. **07**
- (b) Explain any one Numerical integration algorithm used to solve differential equations. Compare their relative performance. **07**
- OR**
- (b) Give comparison between various load flow methods. **07**
- Q.3** (a) Draw the flowchart for Fast Decoupled load flow (FDLF) method for 'n' bus power system having both PV and PQ buses. State all the assumption made to derive equations and justify the same. **07**
- (b) Consider 4 bus system shown below, where in line reactance are indicated in per unit. Line resistances are negligible. The magnitude of all four-bus voltages is specified to be 1.0 per unit. Injected bus powers (S) are specified below. Considering bus-1 as slack bus find out line flows and reactive power at each bus using DC (Approximate) load flow method. **07**

Bus	PD	QD	PG	QG
1	1.0	0.5	?	?
2	1.0	0.4	4.0	?
3	2.0	1.0	0	?
4	2.0	1.0	0	?

**OR**

- Q.3 (a)** Draw the flow chart for sequential single-phase AC-DC load flow program. **07**
Explain all step of program.
- (b)** What are the various methods to get solution of optimal load flow? Explain **07**
optimal load flow program algorithm steps using any one method.
- Q.4 (a)** Giving example, explain optimal dispatch and secure dispatch. **07**
- (b)** Explain Linear Sensitivity factors, Generation shift factor and line outage **07**
distribution factor for Power System Security.
- OR**
- Q.4 (a)** What are the factors, which affects security of Power System? **07**
- (b)** Explain performance index (PI). How it is useful for contingency selection? **07**
- Q.5 (a)** What is State Estimation? State application of State Estimation in Power **07**
System.
- (b)** Explain Network Observability and Pseudo measurements. **07**
- OR**
- Q.5 (a)** Write short note on Maximum Likelihood Weighted Least Squares Estimation. **07**
- (b)** Explain sparsity techniques and its advantages. Give any one method to store **07**
sparse matrix in computer.
