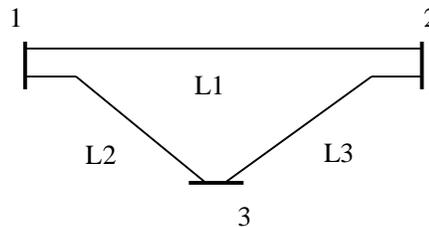


GUJARAT TECHNOLOGICAL UNIVERSITY**M.E. SEMESTER I (old course)–EXAMINATION (Remedial) – WINTER 2015****Subject code: 710701****Date: 08/12/2015****Subject Name: Power System Modeling and Simulation****Time: 10:30 AM to 1:00 PM****Total Marks: 70****Instructions:**

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

- Q.1** (a) Derive the equation $Y_{BUS} = A y A^T$ in relation to graph theory. **07**
 (b) With suitable examples, explain Bus incidence matrix (A) and fundamental loop matrix (B) for a graph. **07**

- Q.2** (a) Prepare a flowchart of the NR method applicable to power flow analysis. Consider the voltage limit violations and reactive power limit violations for the analysis. **07**
 (b) Find out the bus impedance matrix (Z_{BUS}) for the system shown in the following figure using building algorithm. Each of the line (L1, L2 and L3) has a series impedance of $j0.15$ pu and the shunt admittance of $j0.01$ pu. Neglect mutual coupling **07**

**OR**

- (b) In case of the data given in Q-2 (b) above, if the net injected powers are: $S_2 = 0.5 + j 1.0$ pu and $S_3 = -1.5 - j 1.0$ pu, find out the bus voltages at the end of first iteration using GS method. Assume initial values of all bus voltages equal to 1.0 pu and bus no. 1 as slack bus. **07**
- Q.3** (a) Give a comparison between NR method and GS method for power flow analysis. **07**
 (b) Write the differential equation for a series RC circuit connected to a DC supply. Briefly explain how the solution of this equation can be obtained using forward Euler method. **07**

OR

- Q.3** (a) What is numerical integration? Mention the names of numerical integration techniques. Explain trapezoidal method in detail. **07**
 (b) Differentiate between NR method and Decoupled Load Flow method. Also mention advantages and limitations of DLF method. **07**
- Q.4** (a) Briefly describe generation shift factor and line outage distribution factor. **07**
 (b) State and explain the factors affecting power system security. **07**

OR

- Q.4** (a) Briefly explain concentric relaxation technique in relation to power system security. **07**
 (b) Write a short note on weighted least square state estimation. **07**

- Q.5 (a)** With a suitable example discuss the importance of pseudo measurement in state estimation. **07**
- (b)** Mention the situations where we need to use sparse matrices in power system analysis. Mention the names of sparse matrix storage techniques. Explain any one of them in detail. **07**

OR

- Q.5 (a)** Explain state estimation using orthogonal decomposition. **07**
- (b)** What is LU factorization? Explain how it can be used in analysis. **07**
