Reg. No.



## VI SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING) END SEMESTER EXAMINATIONS, APRIL - MAY 2017

## SUBJECT: COMPUTER TECHNIQUES IN POWER SYSTEM ANALYSIS [ELE4009]

REVISED CREDIT SYSTEM

Time: 3 Hours	Date: 27 April 2017	Max. Marks: 50
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## **Instructions to Candidates:**

- ✤ Answer ALL the questions.
- Missing data may be suitably assumed.
- Use of MATLAB may be allowed.
- **1A.** Consider the power system shown in Fig. Q1A. Form i) Bus Incidence matrix and ii) Bus admittance matrix using singular transformation. Take ground as reference bus. Impedances are given in pu. The mutual impedance between lines 1-2 & 1-3 is j0.1 pu.



Fig. Q(1A)

**1B.** Form bus impedance matrix using Zbus building algorithm for the system shown in Fig. Q1B. Take bus 1 as reference bus. Impedances are given in pu.



*06* 

*04* 

 2A. For the system shown in Fig. Q2A, Compute the voltages at buses 2 & 3 for 1<sup>st</sup> & 2<sup>nd</sup> iteration. Taking 2<sup>nd</sup> iteration values, find the slack bus power and line loss in 1-2. Use FDLF method. Take 100 MVA as the base. Impedances are given in pu.



- **2B.** Differentiate between G-S, N-R method and FDLF method used for load flow studies based on the following factors i) convergence characteristics & ii) time per iteration. *03*
- **3A.** Compute the first iteration Jacobian matrix J1 and J4 using N-R method for the system shown in Fig. Q2A. *05*
- **3B.** Explain Milne's predictor and corrector method of solving swing equation. **03**
- **3C.** What are the factors that affect transient stability limit?
- 4A. A 50Hz, 500 MVA, 400kV generator is connected to a 400kV infinite busbar through an interconnector. The generator has an inertia constant of 2.5MJ/MVA, voltage behind transient reactance of 450kV and is loaded 460MW. The transfer reactances between the generator and the busbar under various conditions taking generator rating as base are prefault=0.5pu, during fault=1pu and postfault=0.75pu. The time interval is 0.05s and the fault is cleared in 0.15s. Determine the transient stability of the system by drawing swing curve for 0.5s using Modified Euler's method.

**4B.** Write the algorithm to perform transient stability analysis of a multi-machine system using **04** R-K 4<sup>th</sup> order technique.

5. Consider the system shown in Fig Q5. Using Zbus, compute the fault current, voltages at all the buses in phase quantities when an L-G fault occurs at bus 3 through a fault impedance of j0.1pu. The reactances of G1 & G2: x"=x2=j0.15 pu, x0=j0.05pu, xn= j0.25/3pu. T1 & T2: x1=x2=x0=j0.1pu. Line L12: x1=x2=j0.125 pu, x0=j0.3pu. L13: x1=x2=j0.15 pu, x0=j0.35pu. L23: x1=x2=j0.25 pu, x0=j0.7125pu

All the impedances are given on a base of 100 MVA.



Fig. Q(5)

10

07

*02*