Code No: RR410203 **RR**

IV B.Tech I Semester(RR) Supplementary Examinations, November 2010
COMPUTER METHODS IN POWER SYSTEMS
(Electrical & Electronic Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. The data for 2-bus system is given below.
   S_{G1} =Unknown; S_{D1}=Unknown
   V_1=1.0$\angle$ 0^0 p.u.; S_1=To be determined
   S_{G2}=0.25+jQ_{G2} p.u.; SD_2=1+j 0.5 p.u. The two buses are connected by a transmission line of p.u. reactance of 0.5 p.u. Find Q_2 and $\angle$ V_2. Neglect shunt susceptance of the tie line. Assume $|V_2|$=1.0. Perform two iterations using G.S. method. [16]

2. (a) Describe the Newton-Raphson method for the solution of power flow equations in power systems deriving necessary equations.
   (b) What are P-V Buses? How are they handled in the above method. [12+4]

3. Explain clearly with a detailed flow chart the computational procedure for load flow solution using decoupled method deriving necessary equations. [16]

4. (a) Derive the expressions for bus voltages , line currents when a three phase symmetrical fault through a fault impedance occurs at a particular bus , using bus impedance matrix.
   (b) A three phase fault with a fault impedance of 0.16 p.u. occurs at bus 3 , for which Z_{BUS} is given by :

$$Z_{BUS} = \begin{array}{c} \\ 1 \\ 2 \\ 3 \end{array} \begin{array}{c} \begin{array}{ccc} 1 & 2 & 3 \end{array} \\ \begin{bmatrix} j_{0.016} & j_{0..8} & j_{0.12} \\ j_{0.08} & j_{0.24} & j_{0.16} \\ j_{0.12} & j_{0.16} & j_{0.34} \end{bmatrix} \end{array}$$

   Compute the fault current, the bus Voltages, and the line currents during the fault. Assume prefault bus voltages 1.0 per unit. [8+8]

5. Develop the expressions for the following matrices which are used for shunt fault analysis for single line to ground fault occurring as converntional phase 'a'.
   (a) Fault impedance matrix in phase component form [2]
   (b) Fault admittance matrix in phase and sequence component form. [4+4]
   (c) Derive the formulae used. [6]

6. (a) Define the following terms :
      i. Steady state stability limit.
      ii. Dynamic state stability limit.
      iii. Transient state stability limit .
   (b) List the assumptions made in the transient stability solution techniques.
   (c) Derive the expression for steady state stability limit using ABCD parameters.
   [2+2+2+4+6]

7. (a) Discuss the methods to improve steady state and transient state stability limits.
   (b) What is equal area criterion? Explain how it can be used to study stability? select any suitable example . [8+8]

8. (a) Give the mathematical model for the transient stability analysis of multi machine power system.
   (b) Discuss fourth-order Runge-Kutta for solving the swing equation. [8+8]

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