

**IV B.Tech I Semester Supplementary Examinations, April/May 2005**  
**COMPUTER METHODS IN POWER SYSTEMS**  
**(Electrical & Electronic Engineering)**

Time: 3 hours

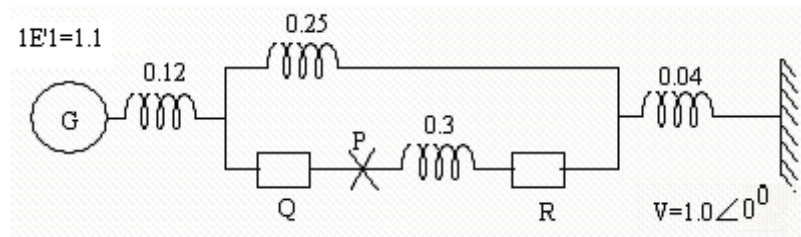
Max Marks: 70

Answer any FIVE Questions  
All Questions carry equal marks

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1. (a) Give detailed steps to implement Gauss-Seidal load flow algorithm taking into account voltage controlled buses.  
(b) Give the convergence criterion for Newton-Raphson load flow studies.
2. (a) Briefly compare Gauss-Seidal and Newton-Raphson methods of solving power flow problem.  
(b) How are buses classified for load-flow studies? Explain the importance of slack bus.  
(c) State Load flow problem.
3. (a) What are the causes of unsymmetrical faults in a Power System? Derive an expression for the fault current for a double line to ground fault.  
(b) What is fault impedance?  
(c) Define Z-Bus Matrix.
4. (a) A synchronous generator is rated 10MVA 13.8K.V. It has positive, negative and zero sequence reactance of 0.15, 0.15 and 0.05 p.u respectively. A single line to ground fault occurs when the alternator is working on no load at a terminal voltage of 13.2K.V. Determine the value of fault current in amperes where the neutral is grounded through
  - i. a reactance of  $0.7 \Omega$
  - ii. a resistance of  $0.7\Omega$ .  
(b) Give the zero sequence network of:  
  
 $Y-Y_{\underline{0}}$  and  $\Delta - Y$  transformers.
5. (a) Define the following terms:
  - i. Transfer reactance
  - ii. Inertia constant  
(b) Derive Swing equation for a single generator connected to infinite bus system. State the approximations if any. Also state the reasons for non-linearity of this equation.
6. (a) Explain clearly with diagrams how equal area criterion can be applied to examine the transient stability of two machine system subjected to

- i. single line to ground fault
  - ii. Three phase fault.
- (b) Define:
- i. Stability of a power system
  - ii. Steady state stability limit.
7. (a) Distinguish between steady state, transient and dynamic stability.
- (b) Consider the 50HZ power system having the p.u reactance diagram shown below



The generator was delivering 1.0 p.u power before a three phase fault occurs at P. The fault was cleared by opening the circuit breakers Q and R and thus isolating the faulty line in 5 cycle. Generator has an inertia constant of 4.0 p.u using step-by-step method with a time interval of 0.05 sec. Obtain the swing curve for a period of 0.2 sec.

8. (a) Write short notes on DC Load flow studies.
- (b) Discuss the merits and demerits of different types of load flow methods.
- (c) What are the guidelines to choose slack bus?

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