Register Number | | | | | | | |

SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act,1956)

Course & Branch :B.E - EEE/P-EEE
Title of the Paper :Power system Analysis — Max. Marks :80
Sub. Code :614504-614PT403 — Time : 3 Hours
Date :13/11/2009 — Session :FN

PART - A (10 x 2 = 20)

Answer ALL the Questions

1. What is the need for system analysis in planning and operation of power system?

2. How are the base value chosen in per unit representation of a power system?

3. Draw the π equivalent circuit of a transformer with off nominal tap ratio.

4. Define bus incidence matrix.

5. Mention two objectives of short circuit analysis.

6. Draw the zero sequence n/w of a star connected generator with zero sequence impedance Z_{go}, when the neutral is grounded through an impedance Z_{no}.

7. What are the three classes of busses of a power system used in power flow analysis? What are the quantities to be specified and to be completed for each class during power flow solution?

8. Compare Gauss-Seidal method and Newton Raphson method with respect to number of iterations taken for convergence and memory requirement.

9. Define critical clearing time.

10. Write the power angle equation of a synchronous machine connected to an infinite bus and also the expression for maximum power transferable to the bus.

PART – B (5 x 12 = 60)

Answer All the Questions

11. Explain single line and reactance diagram of a power system. Also explain the per unit system of analysis power system problems and its advantages.

(or)

12. Explain in detail about the per phase analysis of symmetrical three phase system.

13. Explain bus admittance and bus impedance matrix formation. Discuss the π-equivalent circuit of transformer with off-nominal tap-ratio.

(or)

14. Explain the modeling of generator, load and transmission line for short circuit, power flow and stability.

15. Derive the formula for fault current, fault bus voltages and current through the lines for a 3 phase symmetrical fault at a bus in a power system using $\bar{Z}$ bus. State the assumptions made in the derivation.

(or)

16. Explain the various objectives in short circuit analysis. Derive the components of $\bar{Z}$ bus in sequence frame fault matrices.

17. (a) Discuss the procedure for representing a tap charging transformer in the formation of system matrix (Y_{BUS}) for load flow studies.
    (b) Explain the procedure for calculating line flows and line flows and line losses.

(or)

18. For the network shown in fig. obtain the complex bus bar voltage at bus 2 at the end of first iteration. Use Gauss-Siedal method. Line impedance shown in fig are in per unit.

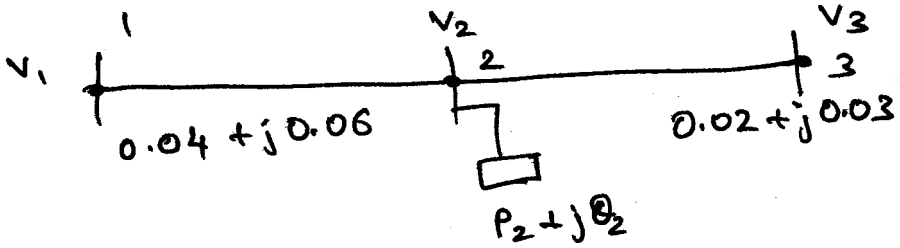
Given: Bus 1 in black bus with $V_1 = 1.00°$

$$P_2 + jQ_2 = -5.96 + j1.46 \quad and$$

$$|V_3| = 1.02$$

$$Assume: \quad V_3^o = 1.02\angle o° \quad and$$

$$V_2^o = 1\angle o°$$



19. (a) Derive the swing equation of a synchronous machine connected to an infinite bus.
    (b) Deduce the condition of equal area criterion for transient stability analysis.

(or)

20. Explain the step wise procedure of determining the swing curve of a synchronos machine connected to infinite bus through a double circuit transmission line using modified Euler's method.