ANNA UNIVERSITY COIMBATORE

B.E. / B.TECH. DEGREE EXAMINATIONS : MAY / JUNE 2010

REGULATIONS : 2007

SIXTH SEMESTER : ELECTRICAL & ELECTRONICS ENGG.

070280050 - POWER SYSTEM ANALYSIS AND STABILITY

TIME : 3 Hours Max.Marks : 100

PART – A

(20 x 2 = 40 MARKS)

ANSWER ALL QUESTIONS

1. What is the need for power system planning analysis?
2. Compare steady state and transient state of a system?
3. Define per unit value?
4. What are the advantages of per unit system?
5. Define bus admittance matrix?
6. List out the methods available for forming bus impedance matrix?
7. What is the role of tap changing transformer?
8. How the loads are represented impedance diagram?
9. In load flow analysis how the various buses are classified?
10. What are the datas needed for load flow study?
11. What is called slack bus?
12. Write the expression for power loss in the transmission line?
13. Name the different types of faults in power system?
14. What is unsymmetrical fault?
15. List the ways by which short circuit current is reduced?
16. Define sub transient reactance?
17. Define stability of power system?
18. List out the various assumptions made in all the stability studies?

19. Write down the expression for swing equation?
20. What is the use of equal area criterion to investigate sudden loss in one of the parallel lines?

PART – B

(5 x 12 = 60 MARKS)

ANSWER ANY FIVE QUESTIONS

21. a) What is an impedance and reactance diagram? Explain its significance. 6

    b) What is primitive network matrix and represent its forms? 6

    Prove Ybus $=A^T$ [y]A using singular transformation?

22. a) For the given power system network shown in figure 1. Obtain the bus admittance matrix? 6

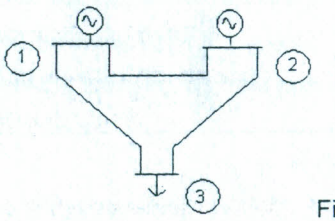

Figure 1

Line data

Sl.No	Bus Code	Line Impedance	Half line Charging Admittance
1	1-2	0.05+j0.25j	0.02j
2	1-3	0+0.15j	0.03j
3	2-3	0.04+0.2j	0.12j

b) Explain the Modeling of generator and transmission line for power system analysis. 6

23. Construct the bus impedance matrix using z-bus building algorithm for the network shown in figure 2. All the impedances are in p.u

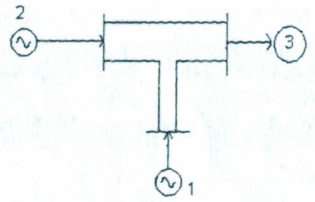

Figure 2

Line data

Sl.No	Bus Code	Line Impedance	Half line Charging Admittance
1	1-2	3+4j	0.4j
2	1-3	1+4j	0.8j
3	2-3	2+6j	0.3j

24. a) Explain the step by step computational procedure of the Newton Raphson method (polar from) for power flow studies? 8

b) Derive the basic equations for load flow studies and also write the assumptions and approximations to get the simple equations. 4

25. a) Derive an expression for the fault current in double line to ground fault on an unloaded generator in terms of symmetrical components? 8

b) Derive the equations to calculate line flows in transmission line. 4

26. A three phase transmission line operating at 33 KV and having a resistance and reactance of 5Ω and 20 Ω respectively is connected to a generating station bus bar through a 15 MVA step up transformer which has a reactance of 0.06 p.u. connected to the bus bars are two generators one 10 MVA having 0.10 p.u reactance and another 5 MVA having 0.075 p.u reactance. Calculate the short circuit MVA and the fault current when a three phase short circuit occurs a) at the high voltage terminals of the transformer b) at the load end of the transmission line

27. a) Describe in detail any one method of improving stability limits. 6

b) A 3 phase 50 Hz transmission line is 200 Km long. The line parameters are r = 0.1ohm /Km; x = 0.25 ohm/km; y = 3 × 10-6 mho / Km. The line is represented by nominal p model. If |VS | = |VR | = 200KV determine steady state stability limit. 6

28. a) Explain the step by step algorithm for determining the power system stability using Runge kutta method? 6

b) A salient pole synchronous generator is connected to an infinite bus via a line. Derive an expression for electrical power output of the generator and draw p-d curve. 6

*****THE END*****