R13

Code No: 126AG

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, May - 2017

COMPUTER METHODS IN POWER SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

1.a) Define the bus incidence matrix. [2]

b) What are the merits for formation Y_{bus} by direct inspection method? [3]

c) What data is necessary for power flow studies? [2]

d) What is the need of DC load flows? [3]

e) What are the various types of series reactors used for reducing the short circuit MVA? [2]

f) What is the significance fault current calculation and which fault is more severe? [3]

g) Define the stability limit in power system. [2]

h) Define the transfer reactance and synchronizing power coefficient. [3]

i) What are the various applications of equal area criterion? [2]

j) What are the various methods to improve transient Stability? [3]

PART - B

(50 Marks)

2. For the figure 1 shown below, the impedance data is given in table. Determine Y_{Bus} matrix by singular transformation method [10]

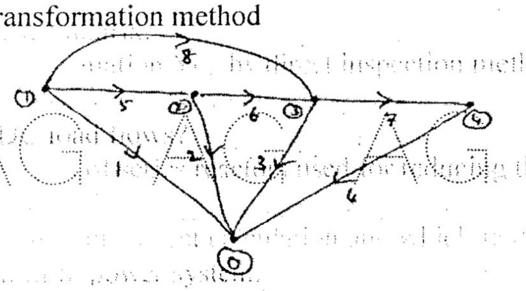

Figure 1

Table

Element	Bus code	Self impedance in p.u
1	0 – 1	0.1
2	0 – 2	0.2
3	0 – 3	0.3
4	0 – 4	0.35
5	1 – 2	0.4
6	2 – 3	0.1
7	3 – 4	0.2
8	1 – 3	0.15

OR

3. Find the Z_{Bus} for the power system network shown in below figure 2. All reactance's are in p.u values. [10]

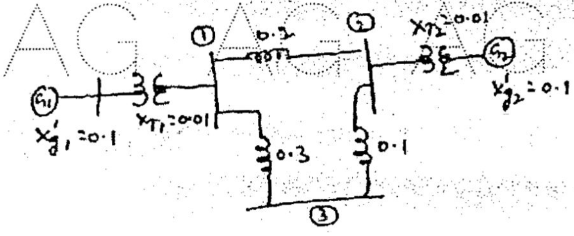

Figure 2

4.a) Explain the necessity of load flow solution.

b) Write an algorithm for Gauss seidal load flow method by considering all types of buses. [3+7]

OR

5. Single line diagram of a simple power system with generators at buses 1 and 3 shown in below figure 3. The necessary data are given in the figure. Line impedances are marked in p.u.on a 100MVA base. Determine the following using Fast-decoupled load flow method at the end of first iteration. [4+3+3]

a) Voltage at buses 2 and 3 b) Slack bus power c) Direction of line flows.

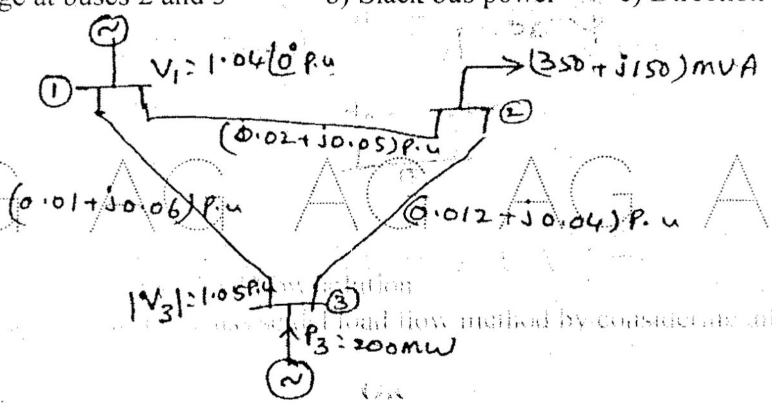

Figure 3

6. A transformer rated at 30 MVA and having a short circuit reactance of 0.02 p.u is connected to the bus bar of a generating station which is supplied through two 12.6 kV feeders each having an impedance of (2+j4) Ω. One of the feeder is connected to the generating station using generator capacity of 40 MVA connected to its bus bars having a short circuit reactance of 0.12 p.u and other feeder to a generator with 30MVA and having a reactance of 0.3 p.u. Find the kVA supplied to the fault in the event of a short circuit occurring between the secondary terminals of the transformer. [10]

OR

7.a) What do you understand by sequence network? What is their importance in unsymmetrical fault calculations?

b) A generator rated 100MVA, 12.6 kV has $X_1 = X_2 = 25\%$ and $X_0 = 10\%$. Its neutral is grounded through a reactance of 0.2 Ω. The generator is operating at rated voltage, load is disconnected from the system when single line to ground fault occurs at its terminals. Find the sub-transient current in the fault phase and line to line fault current. [4+6]

8.a) Explain the methods to improve the steady state stability.

b) Describe the power angle curve. [5+5]

OR

9. In the double circuit network shown in below figure, a line to ground fault occur on one of the double circuit transmission line at the point shown in the figure 4. Find the transfer reactance and maximum power transfer .

a) Before the fault occurs

b) While the fault exists and

c) After the faulty line has been removed. [3+3+4]

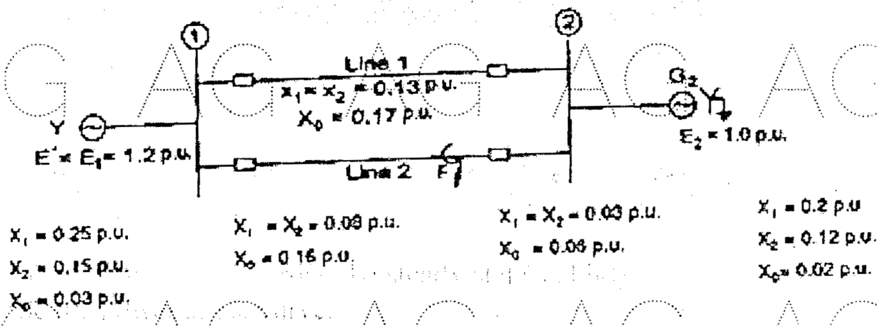

Figure 4

10. Derive an expression for the critical clearing angle for a power system consisting of a single machine supplying to an infinite bus, for a sudden load increment. [10]

OR

11. Explain point-by-point method for solving the swing equation. [10]

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