Code No: 126AG **R13**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II 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]

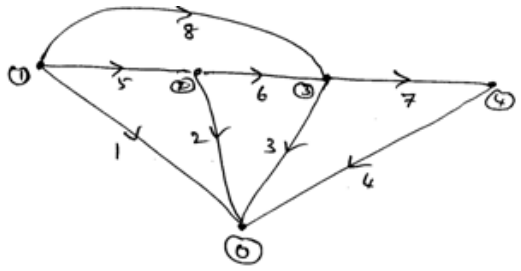

Figure 1

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]

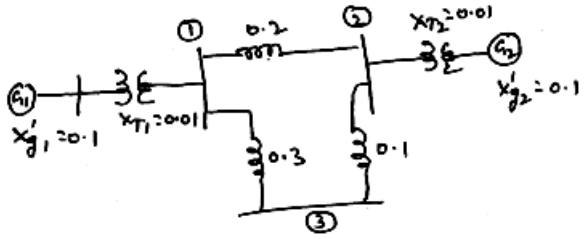

Figure 2

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.

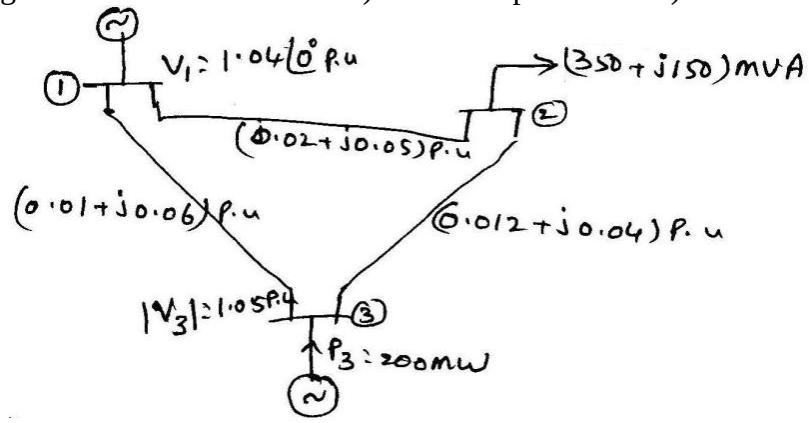

Figure 3

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+j 4) 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]

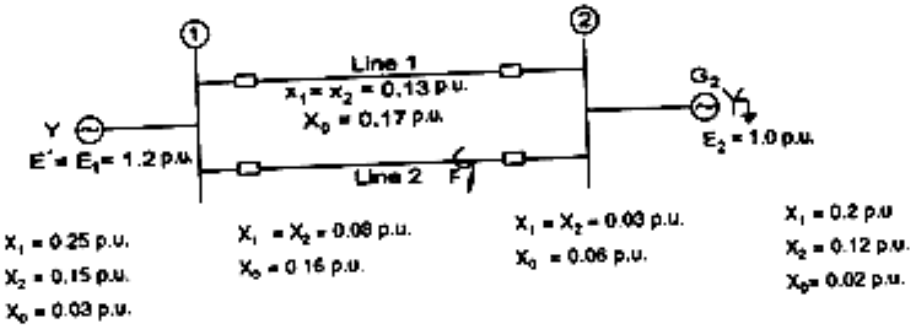

Figure 4

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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