B.E. Electrical (Electronics & Power) Engineering Sem-VIII

EP801 - Computer Applications in Power System

P. Pages : 3 **GUG/S/19/2009**

Time : Three Hours Max. Marks : 80

Notes :
1. All questions carry equal marks.
2. Assume suitable data wherever necessary.
3. Illustrate your answers wherever necessary with the help of neat sketches.
4. Follow the internal choices carefully while attempting questions.
5. Use of non programmable electronic calculator is permitted.
6. Answer **five** questions as per internal choice.

1. a) What do you mean by primitive network ? How will you represent power system elements in it ? **3**

b) Derive an expression for formation of branch admittance matrix, Y_{BR} using singular transformation. **5**

c) For the network shown in fig. Q. 1 (c) form **8**

i) Bus incidence matrix, A

ii) Branch-path incidence matrix, K

iii) Basic cut set incidence matrix, B

iv) Basic loop incidence matrix, C

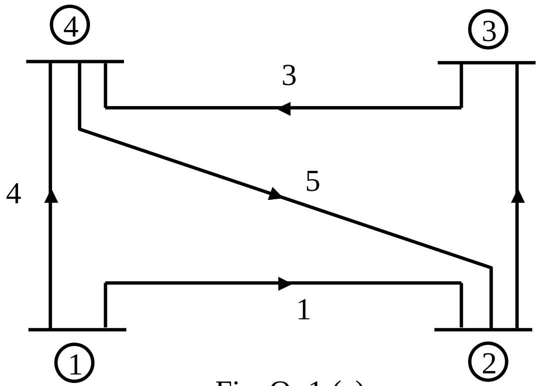

Fig. Q. 1 (c)

OR

2. a) Derive an expression for formation of bus admittance matrix using singular transformation. **4**

b) The positive sequence reactances for the network shown in fig. Q. 2 (b) are given in table Q. 2 (b). Designate elements A-B and D-F as links and node G as the reference bus form :

i) Bus incidence matrix, A **2**

ii) Basic cut set incidence matrix, B **2**

iii) Basic loop incidence matrix, C **2**

iv) Bus admittance matrix and branch admittance matrix using singular transformation. **6**

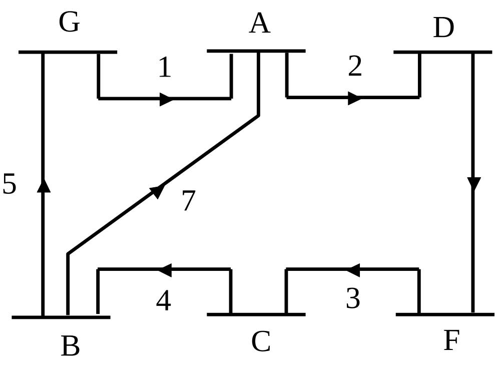

Fig. Q. 2 (b)

Element	Positive Sequence reactance
G-A	0.04
G-B	0.05
A-B	0.04
B-C	0.03
A-D	0.02
C-F	0.07
D-F	0.10

Table Q. 2 (b)

3. For the system shown in fig. Q. 3 form the bus impedance matrix through an algorithm. Self impedances of different elements are shown in Fig. Q. 3. Select bus - 1 as a reference. **16**

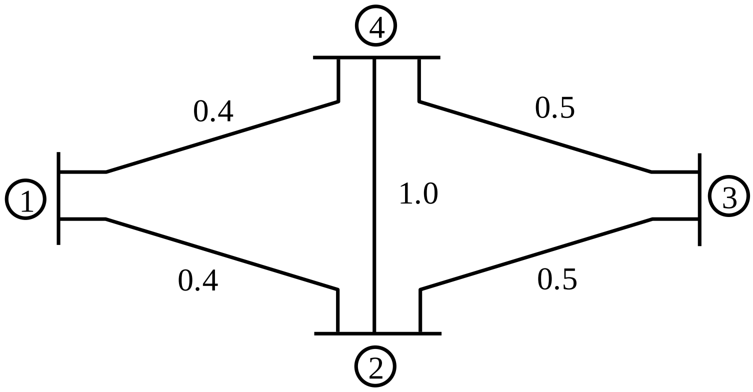

Fig. Q. 3

OR

4. a) How three phase network component is represented in impedance and admittance form ? Write down the performance equation of the three phase element in both these forms. **8**

b) Using suitable transformation matrix 'T', transform three phase impedance matrix to its equivalent in 0, 1, 2 sequence quantities. Assume stationary element. **8**

5. a) What are the different types of buses named in load flow analysis ? Mention the known and unknown quantities on each bus. **4**

b) Give and explain the flow chart for load flow solution in power system by Gauss-Seidel iterative method using bus admittance matrix. Explain how the procedure is modified to take into account the existence of voltage controlled buses. **12**

OR

6. a) What is the significance of load flow analysis ? **3**

b) Give and explain the flow chart for load flow solution in power system by Newton-Raphson method using bus admittance matrix. **10**

c) Compare the Gauss-Seidel and Newton-Raphson method for power flow solution. **3**

7. a) Why short circuit study is necessary ? State the assumptions made for short circuit studies. **4**

b) For a three phase to ground fault at bus 'P' in a power system, derive an expression for : **12**
i) Faulted bus voltage
ii) Fault current and
iii) Voltages at other buses

OR

8. a) How is the three phase power system represented under steady state condition and for short circuit studies ? **4**

b) For a line to ground fault at P^{th} bus in a power system, obtain expression for : **12**
i) Faulted bus voltage
ii) Fault current and
iii) Voltages at other buses

9. a) Derive the swing equation of a machine connected to an infinite bus through a transmission network. **6**

b) With the help of a flow chart, discuss the algorithm to be sued for transient stability study of a power system which employs the modified Euler's method. **10**

OR

10. a) State the assumptions made for transient stability studies. **4**

b) With the help of a flow chart, discuss the algorithm to be used for transient stability analysis of a power system employing the Runge-Kutta fourth order method. **12**

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