QUESTION BANK

UNIT-1

1. Define the following and give an illustrative example: i) tree and co-tree ii) Basic loops iii) Basic cut sets iv) primitive network v) Bus frame of reference. vi) path vii) link viii) oriented connected graph ix) primitive network
   Dec.2013/Jan.2014, Dec2012, Dec2011, . June/July 2011

2. Derive an expression for obtaining Y-bus using singular transformations.
   Dec.2013/Jan.2014, Dec2012

3. Given that the self impedances of the elements of a network referred by the bus incidence matrix given below are equal to: Z1=Z2=0.2, Z3=0.25, Z4=Z5=0.1 and Z6=0.4 units, draw the corresponding oriented graph, and find the primitive network matrices. Neglect mutual values between the elements.

A =

-1	0	0
0	-1	0
0	0	-1
1	-1	0
0	1	-1
1	0	-1

Dec.2013/Jan.2014

4. What is primitive network? Explain with circuit and equations the significance of it in both impedance and admittance forms. June/July2013, Dec2012, June/July 2011, June/July 2011

5. For the sample network-oriented graph shown in Fig.below by selecting a tree, T(1,2,3,4), obtain the incidence matrices A and Aˆ . Also show the partitioned form of the matrix-A.

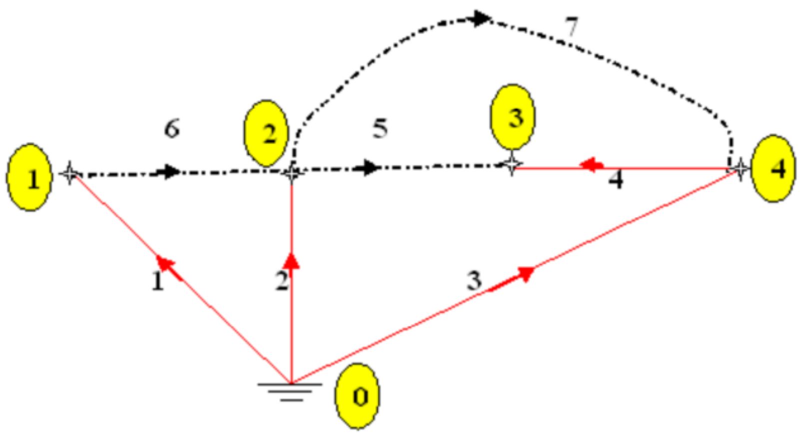


Fig. Sample Network-Oriented Graph

June/July2011, Dec 2011, June/July2013

6. For the sample-system shown in Fig. E3, obtain an oriented graph. By selecting a tree, T(1,2,3,4), obtain the incidence matrices A and Aˆ . Also show the partitioned form of the matrix-A.

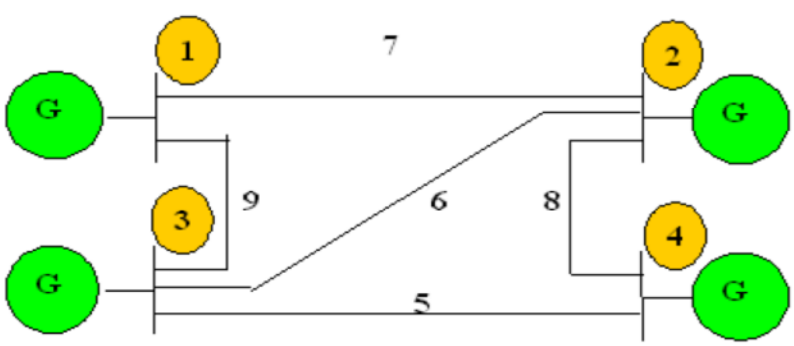
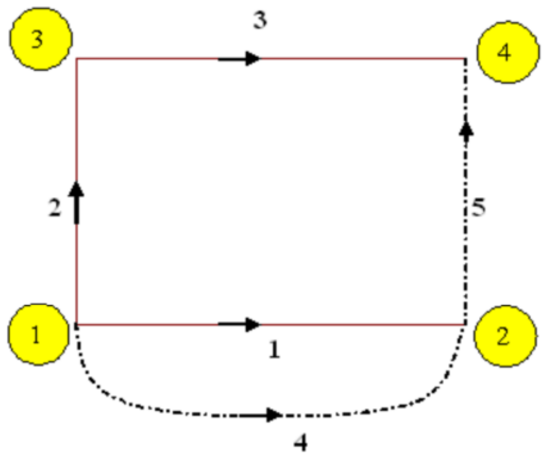


Fig. E3a. Sample Example network

June/July2011, Dec 2013/14

7. For the network of Fig E8, form the primitive matrices [z] & [y] and obtain the bus admittance matrix by singular transformation. Choose a Tree T(1,2,3). The data is given in Table .



Elements	Self impedance	Mutual impedance
1	j 0.6	-
2	j 0.5	j 0.1(with element 1)
3	j 0.5	-
4	j 0.4	j 0.2 (with element 1)
5	j 0.2	-

Dec2012, June/July 2012

8. Derive the expression for Y_{bus} using Inspection method. June/July2013

UNIT-2

1. Obtain the general expressions for Z_{bus} building algorithm when a branch is added to the partial network. June/July2013

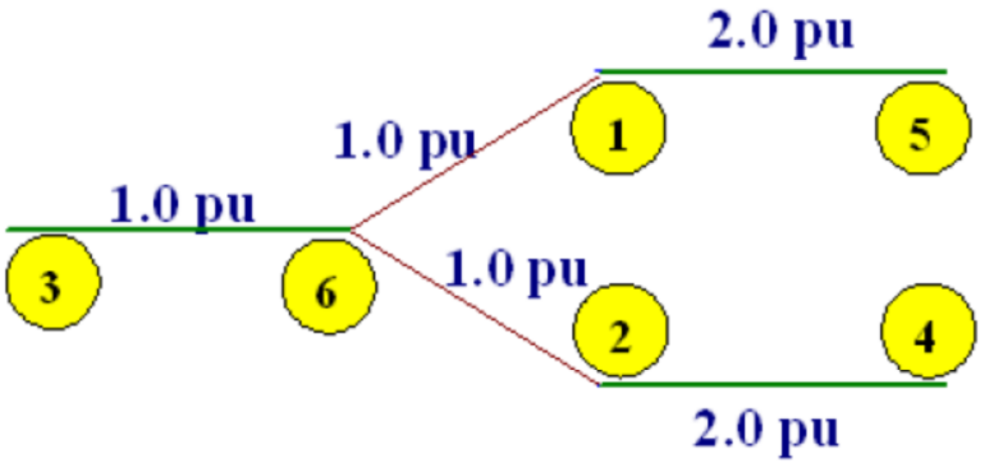
2. Obtain the general expressions for Z_{bus} building algorithm when a Link is added to the partial network. Dec2012

3. Prepare the Z_{bus} for the system shown using Z_{bus} building algorithm For the positive sequence network data shown in table below, obtain Z_{BUS} by building procedure.

Sl. No.	p-q (nodes)	Pos. seq. reactance in pu
1	0-1	0.25
2	0-3	0.20
3	1-2	0.08
4	2-3	0.06

Dec.2013/Jan.2014

4. Prepare the Z_{bus} for the system shown using Z_{bus} building algorithm



June/July 2013

5. Explain the formation of Z_{bus} using Z_{bus} building algorithm

Dec2012

UNIT-3&4

1. Using generalized algorithm expressions for each case of analysis, explain the load flow studies procedure, as per the G-S method for power system having PQ and PV buses, with reactive power generations constraints. June/July2013, Dec 2012, June/July 2011

2. Derive the expression in polar form for the typical diagonal elements of the sub matrices of the Jacobian in NR method of load flow analysis. June/July 2011.

3. Compare NR and GS method for load flow analysis procedure in respect of the following i) Time per iteration ii) total solution time iii) acceleration factor iv)number of iterations
   Dec.2013/Jan.2014, June/July2013, June/July 2011

4. Explain briefly fast decoupled load flow solution method for solving the nonlinear load flow equations. June/July2013, Dec 2012, June/July 2011

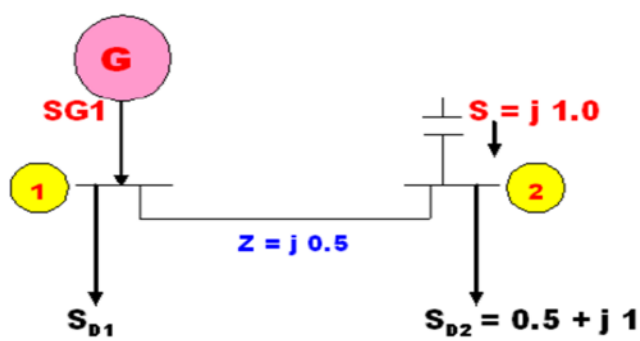
5. What are the assumptions made in fast decoupled load flow method? Explain the algorithm briefly, through a flow chart.
Dec.2013/Jan.2014

6. Explain the representation of transformer with fixed tap changing during the load flow studies
June/July 2011, May/June 2012

7. What is load flow analysis? What is the data required to conduct load flow analysis? Explain how buses are classified to carry out load flow analysis in power system. What is the significance of slack bus.
Dec.2013/Jan.2014, June/July201, Dec 2012, Dec2011

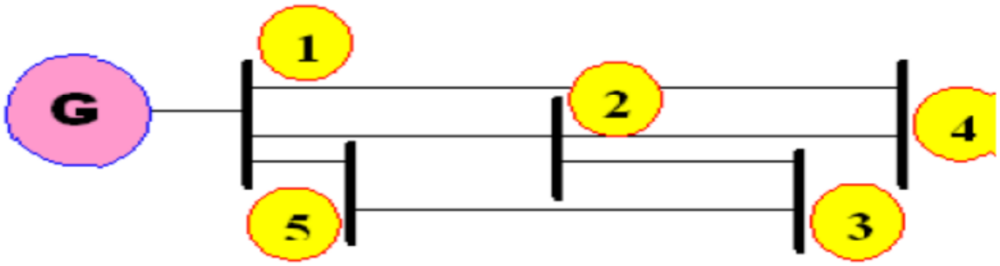
8. Write a short note on i) acceleration factor in load flow solution. June/July2013, Dec2011

9. For the power system shown in fig. below, with the data as given in tables below, obtain the bus voltages at the end of first iteration, by applying GS method.



Dec.2013/Jan.2014

10. For the power system shown in fig. below, with the data as given in tables below, obtain the bus voltages at the end of first iteration, by applying GS method.



Power System of Example 2

Line data of example 2

SB	EB	R (pu)	X (pu)	$\frac{B_C}{2}$
1	2	0.10	0.40	-
1	4	0.15	0.60	-
1	5	0.05	0.20	-
2	3	0.05	0.20	-
2	4	0.10	0.40	-
3	5	0.05	0.20	-

Bus data of example 2

Bus No.	P_G (pu)	Q_G (pu)	P_D (pu)	Q_D (pu)	$\|V_{SP}\|$ (pu)	δ
1	-	-	-	-	1.02	0^o
2	-	-	0.60	0.30	-	-
3	1.0	-	-	-	1.04	-
4	-	-	0.40	0.10	-	-
5	-	-	0.60	0.20	-	-

Dec2011

11. Obtain the load flow solution at the end of first iteration of the system with data as given below. The solution is to be obtained for the following cases

(i) All buses except bus 1 are PQ Buses

(ii) Bus 2 is a PV bus whose voltage magnitude is specified as 1.04 pu

(iii) Bus 2 is PV bus, with voltage magnitude specified as 1.04 and 0.25_Q2_1.0 pu.

June/July2012, Dec2011

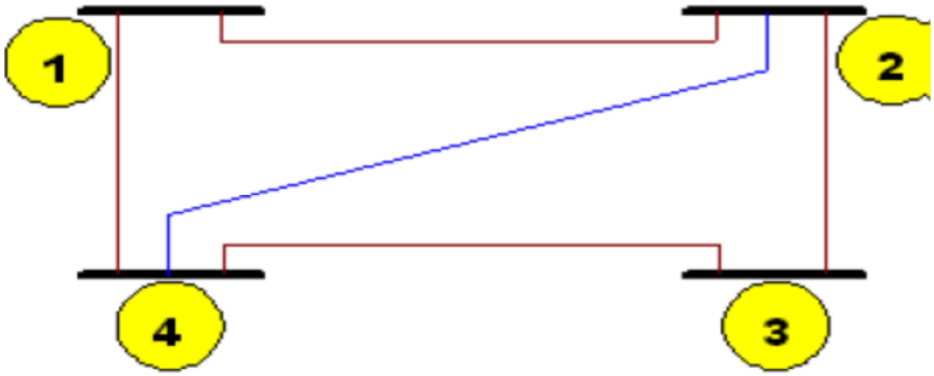


Fig. System for Example 3

Table: Line data of example 3

SB	EB	R (pu)	X (pu)
1	2	0.05	0.15
1	3	0.10	0.30
2	3	0.15	0.45
2	4	0.10	0.30
3	4	0.05	0.15

Table: Bus data of example 3

Bus No.	P_i (pu)	Q_i (pu)	V_i
1	–	–	$1.04\angle 0^0$
2	0.5	– 0.2	–
3	– 1.0	0.5	–
4	– 0.3	– 0.1	–

UNIT-5&6

1. Derive the necessary condition for optimal operation of thermal power plants with the transmission losses considered.
   Dec.2013/Jan.2014, Dec 2012, June/July 2011

2. What are B- coefficients? Derive the matrix form of transmission loss equation. Explain the method of equal incremental cost for the economic operation of generators with transmission loss considered.
   Dec.2013/Jan.2014, June/July2013, Dec 2012, Dec2011, June/July 2011

3. Explain problem formation and solution procedure of optimal scheduling for hydro thermal plants. June/July2013, Dec 2012, Dec2011

4. Explain the equal incremental cost criterion with reference to economic operation of power systems. June/July2013

5. Derive the necessary condition for optimal operation of thermal power plants without the transmission losses considered.
   Dec.2013/Jan.2014

6. Dec.2013.Jan2014/June2013

The fuel cost in \$ / h for two 800 MW plants is given by

$F_1 = 400 + 6.0\ P_{G1} + 0.004\ P_{G1}^2$

$F_2 = 500 + b_2 P_{G2} + c_2 P_{G2}^2$

where P_{G1}, P_{G2} are in MW

(a) The incremental cost of power, λ is \$8 / MWh when total demand is 550MW. Determine optimal generation schedule neglecting losses.

(b) The incremental cost of power is \$10/MWh when total demand is 1300 MW. Determine optimal schedule neglecting losses.

(c) From (a) and (b) find the coefficients b_2 and c_2.

UNIT-7& 8

1. With the help of a flowchart, explain the method of finding the transient stability of a given power system, based on Runge-Kutta method. Dec 2012

2. With necessary equations and flow chart describe the solution of swing equations using modified Eulers method in a multi-machine stability analysis.
   Dec.2013/Jan.2014, June/July2013, Dec 2012

3. Explain with necessary equations the solution of swing equation by step by step method? How discontinuities can be handled.
   Dec.2013/Jan.2014, Dec 2012, Dec2011, June/July 2011

4. With the help of block diagram explain the representation of excitation control system and the speed governing system in stability studies.
   Dec.2013/Jan.2014, Dec 2012, June/July 2011

5. Explain: i) Generator model; ii) load model employed in multi machine stability studies.
   Dec.2013/Jan.2014, Dec 2012, June/July 2011

6. Explain clearly the representation of synchronous machine and load for transient stability studies. Dec2011

7. Derive the swing equation for a two machine system.
   Dec.2013/Jan.2014, Dec 2012, Dec2011, June/July 2011

8. With the help of block diagram explain simplified representation of a speed governor.
   Dec.2013/Jan.2014, Dec 2012, June/July 2011

9. Write short notes on: i)Area control error ii) Automatic economic load dispatch June/July 2013

10. Formation of Y-bus by inspection method Dec2012

11. Write a note on Automatic voltage regulators June/July 2012

12. Explain milmen predictor corrector method. June/July2013

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