SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR

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QUESTION BANK (Descriptive)

Subject with Code : Power System Analysis**(16EE226)** **Course & Branch**: B.Tech– EEE

Year &Sem: III-B.Tech & II-Sem **Regulation:** R16

UNIT –I

POWER SYSTEMS NETWORK MATRICES

1. For the following data form the bus admittance matrix by using By Direct inspection Method, if the line series impedances are as given. [L4][12M]

Bus code	Impedances
1-2	0.15+j0.6 p.u
1-3	0.1+ j0.4 p.u
1-4	0.15+j0.6 p.u
2-3	0.05+j0.2 p.u
3-4	0.05+j0.2 p.u

2. What is incidence matrics ? Explain about formation of Following Incidence matrix. [L2][12M]

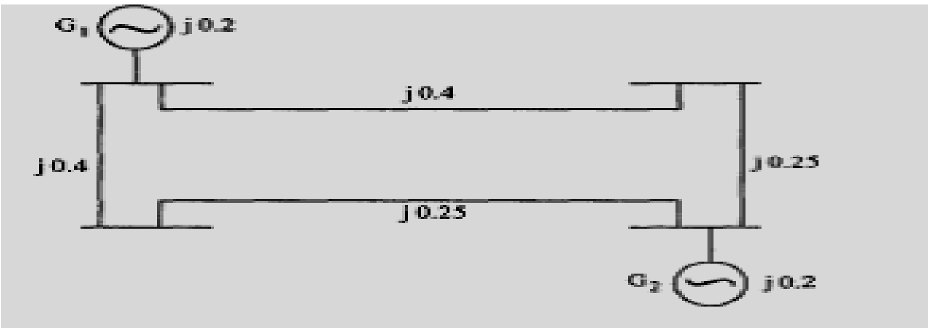
A. Bus incidence matrices B. Basic loop incidence matrices C. Cut set incidence matrices.

3. What is a primitive network and represent its forms? Prove $Y_{BUS} = A^T [y] A$ using singular transformation. [L3][12M]

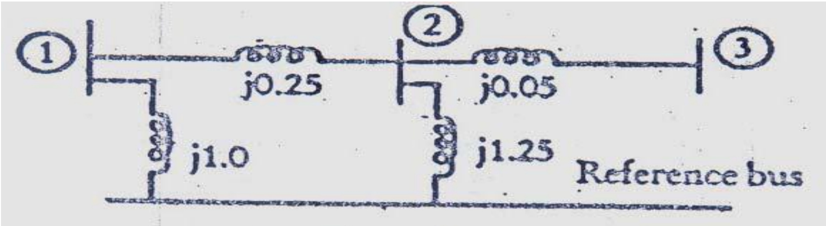
4. Derive the necessary expressions for building up of Zbus when: [L3][12M]

A. New element is added to Reference B. New element is added between two existing buses.

5. Form the YBUS by using singular transformation for the network shown below. Including the generator buses. [L4][12M]

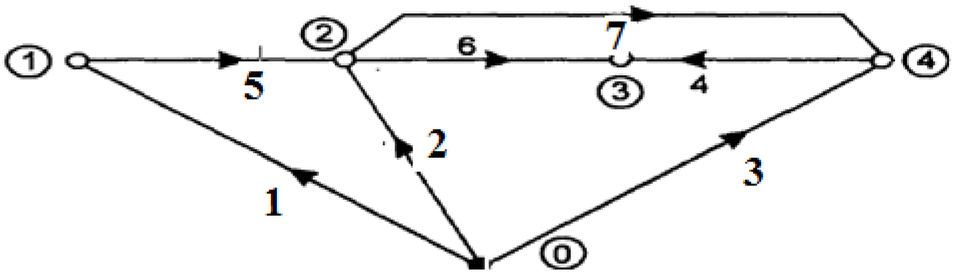


6. Find the bus impedance matrix for the system whose reactance diagram as shown below. All the impedances are in p,u. [L6][12M]

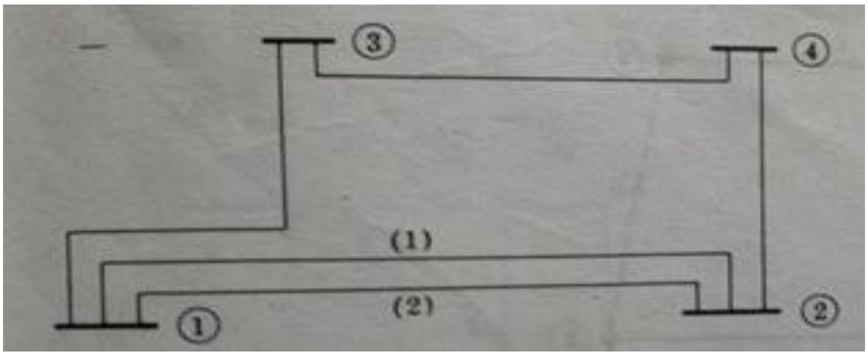


7. For the network shown below. Draw the Oriented graph from that find A[1],A, B and C matrics.

[L4][12M]



8. For the network shown below. Draw the Oriented graph from that find A[1], A, B and C matrices. [L4][12M]



9. A. Derive the expression for Direct inspection method by using 3 Bus systems. [L2][6M]

   B. Give the procedure for Formulation of Loop incidence and cut set incidence matrices. [L4][6M]

10. Define the following with suitable examples [L2][12M]

    A. Branch and Links

    B. Loops and cutsets

    C. Tree and Co-tree

UNIT-II

SHORT CIRCUIT ANALYSIS

1) a) Derive an expression for the fault current for the LLL & LLLG fault. [L2][6M]

b) The unbalance voltages across a three phase system are Va=400∟25º V, Vb=360∟90º V, Vc =450∟-140ºV. Determine the symmetrical components of voltages. [L3][6M]

2) a) Derive an expression for the fault current for the LG& LL fault. [L2][6M]

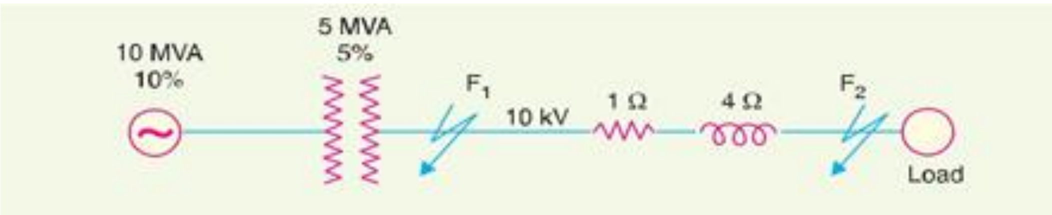
b) An earth fault occurs on one conductor of a 3 conductor cable supplied by a 10MVA, 3 phase alternator has positive negative and zero sequence impedance of (0.5+j4.7) Ω, (0.2+j0.6) Ω and j0.43Ω per phase. The corresponding line to neutral values for the cable upto fault position are (0.36+j0.25) Ω, (0.36+j0.7) Ω and (2.5+j0.95)Ω per phase. Find fault currents and sequence components of currents. The generator is excited to give 6.6kV between lines on open circuit.

[L3][6M]

3) A 3-phase transmission line operating at 10 kV and having a resistance of 1Ωand reactance of 4 Ω is connected to the generating station bus-bars through 5 MVA step-up trans-former having a reactance of 5%. The bus-bars are supplied by a 10 MVA alternator having 10% reactance. Calculate the short-circuit kVA fed to symmetrical fault between phases if it occurs

(i) at the load end of transmission line

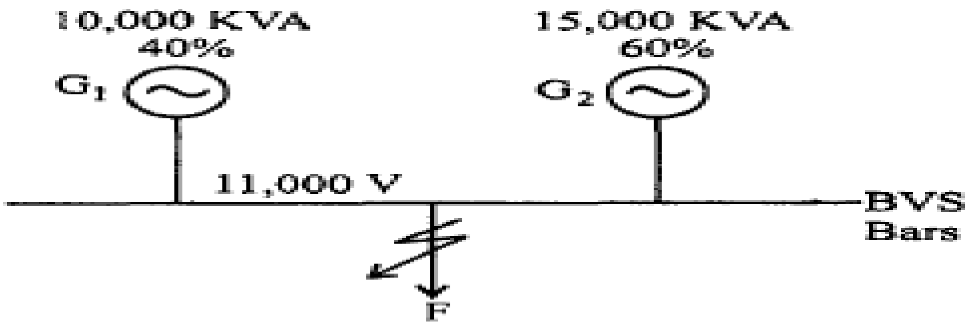
(ii) at the high voltage terminals of the transformer. [L5][12M]



4) a) Define positive, negative and zero sequences components in 3 phase systems. [L2][12M]

b) Explain about sequential components in unloaded generators. [L2][12M]

5) Consider the system shown in Fig bellow The percentage reactance of each alternator is expressed on its own capacity determine the short circuit current that will flow into a dead 3 – Ø short circuit at F. [L4][12M]



6) A. Draw the generator equivalent circuit for sub transient and transient periods. [L2][6M]

B. Derive an expression for the fault current for the 3 ǿ fault. [L2][6M]

7) A. Discuss the principle of symmetrical components. Derive the necessary equations to convert:

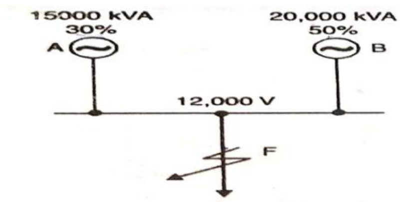
(i) Phase quantities into symmetrical components.

(ii) Symmetrical components into phase quantities. [L2][12M]

8) A. How are reactors classified? Explain the merits and demerits of different types of system protection using reactors. [L2][6M]

B. Define per unit system and advantages of per unit system? [L2][6M]

9) The following figure shows the single line diagram of a 3-phase. The percentage reactances of each Alternators is based on its own capacity. Find short-circuit current that will into a complete 3-phase s.c at fault. [L4][12M]



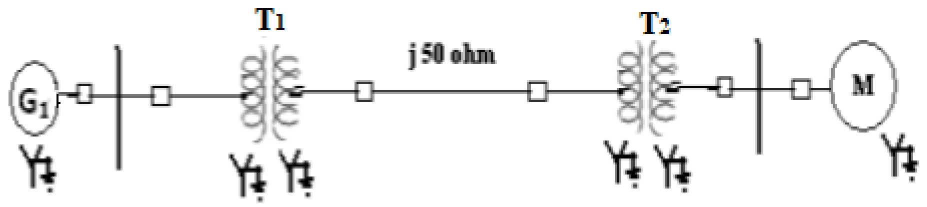
10) Draw the reactance diagram for the power system shown in fig. Neglect resistance and use a base of 100MVA , 220KV in 50KΩ line. The ratings of the generator motor and transformer are give below.

Generator: 40MVA, 25KV, X=20%

Motor: 50MVA, 11KV, X=30%

Transformer T1: 40MVA, 33 /220 KV, X=15%

Transformer T2: 30MVA, 11/220 KV, X=15%. [L5][12M]



UNIT-III

POWER FLOW STUDIES

1) a) Derive and explain about static load flow equations. [L2][6M]

b) Explain the data for Load flow studies. [L3][6M]

2) Explain the flow chart for Gauss-Seidel method without PV buses. [L5][12M]

3) Explain the flow chart for Gauss-Seidel method with PV buses. [L5][12M]

4) a) Write about differences between Gauss-Seidel and Newton Raphson methods. [L2][6M]

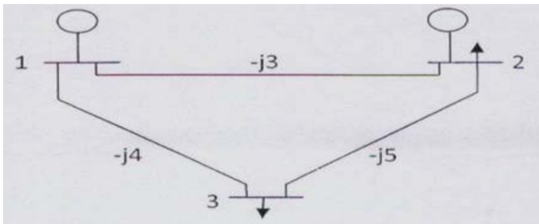
b) Explain algorithm for Decoupled method. [L3][6M]

5) a) Compare NR method and fast decoupled load flow method. [L3][6M]

b) What is load flow analysis? What is the need for load flow studies. [L5][6M]

6) A three bus power systems is shown.

Bus No.	Type	Generation		Load		Bus Voltage	
		P_G	Q_G	P_L	Q_L	V	δ
1	Slack	-	-	-	-	1.02	0
2	PQ	0.25	0.15	0.5	0.25	-	-
3	PQ	0	0	0.6	0.3	-	-



Determine the voltages at buses 2 and 3 after 1st iteration using Gauss-Seidal method. Take the acceleration factor α=1.6. [L4][12M]

7) Give the algorithm for load flow solution for Gauss-Seidel method with PQ buses presents. [L3][12M]

8) Give the algorithm for load flow solution for Gauss-Seidel method with PV buses. [L3][12M]

9) Explain the flow chart for NR method without PV buses. [L5][12M]

10) Explain the flow chart for NR method with PV buses. [L5][12M]

UNIT-IV

TRANSIENT STATE STABILITY ANALYSIS

1) Derive power flow equation and draw power angle diagram for a 2-machine system with

. negligible losses. [L2][12M]

2) a) Discuss the various methods of improving steady state and transient state stability. [L2][6M]

b) Explain the Factors effecting the Transient stability. [L2][6M]

3) Explain about various applications of equal area criterion. [L2][12M]

4) a) State and derive swing equation. [L2][6M]

b) What are the applications of equal area criterian. [L2][6M]

5) a) What is critical clearing angle? Explain by using Swing curves. [L2][12M]

b) Derive an expression for critical clearing angle. [L2][12M]

6) a) Explain the equal area criterion applied to a Generator connected to infinite bus through a line, When fault cleared after some time. [L5][6M]

b) Explain the equal area criterion applied to a Generator connected to infinite bus through a line, When fault Load changing. [L5][6M]

7) a) Derive and explain how to determine of transient stability by equal area criterion. [L5][6M]

b) What are the essential factors for stability problems. [L2][6M]

8) Derive the equation for solution for swing equation by Range Kutta method. [L5][12M]

9) Explain about recent methods of improving transient stability. [L2][12M]

10 A Large generator is delivering 1.0pu power to an initiate bus through a transmission network. The maximum Power switch can be transferred for pre fault, during fault and post fault conditions are 1.8p.u, 0.4p.u and 1.3 p.u respectively find the critical clearing angle. [L4][12M]

UNIT-V

STEADY STATE STABILITY ANALYSIS

1) Define and explain about Steady state stability limit, Transient state stability limit and Dynamic state stability limit. [L2][12M]

2) Explain and derive the equation for steady state power by using ABCD perameters. [L4][12M]

3) Derive the expression for Swing equation. [L2][12M]

4) Derive the expression for steady state power limit. [L2][12M]

5) a) what is steady state stability and steady state stability limit. [L2][6M]

b) Discuss the various methods of improving steady state stability. [L2][6M]

6) Derive and explain about Synchronous power coefficient. [L2][12M]

7) a) Explain about power angle curves. [L2][6M]

b) Explain about factors effecting the steady state stability. [L2][6M]

8) A 50Hz, 4 pole turbo generator rated 20MVA,11kv has inertia has constant of H=9kw-sec/KVA . Find the kinetic energy stored in the rotator at synchronous speed. Find the acceleration, if the input less the rotational losses is 26800HP and the electrical power developed is 16MW. [L4][12M]

9) A 50Hz,4 pole turbo alternator rated 100MVA, 11KV has an inertia constant of 8 MJ/MVA. Find

I. The energy stored in the rotor at synchronous speed.

II. The rotor acceleration if the mechanical input is suddenly raised to 80MWfor an electric load 50MW. [L4][12M]

10 a) What are the essential factors for stability problems. [L4][6M]

b) What is stability? Explain different types of stabilities. [L4][6M]

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