SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY :: PUTTUR

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QUESTION BANK (Descriptive)

Subject with Code : Power System-II **(18EE0216)** **Course & Branch**: B.Tech– EEE

Year &Sem: III-B.Tech & II-Sem **Regulation:** R18

UNIT –I

POWER SYSTEMS NETWORK MATRICES

1. (a) Define bus incidence matrix. [L1][CO1][2M]

   (b)What is graph and sub-graph? [L1][CO1][2M]

   (c) What are the methods for formatting of bus admittance method? [L1][CO1][2M]

   (d) Define cut-set and Tie-set. [L1][CO1][2M]

   (e) What is node and loop? [L1][CO1][2M]

2. For the following data form the bus admittance matrix by using By Direct inspection Method, if the line series impedances are as given. [L3][CO1][10M]

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+5j0.2 p.u
3-4	0.05+j0.2 p.u

3. What is incidence matrix? Explain about formation of Bus Incidence matrix by taking suitable example. [L1][CO1][10M]

4. What is a primitive network and represent its forms? Prove $Y_{BUS} = A^T [y] A$ using singular transformation. [L1][CO1][10M]

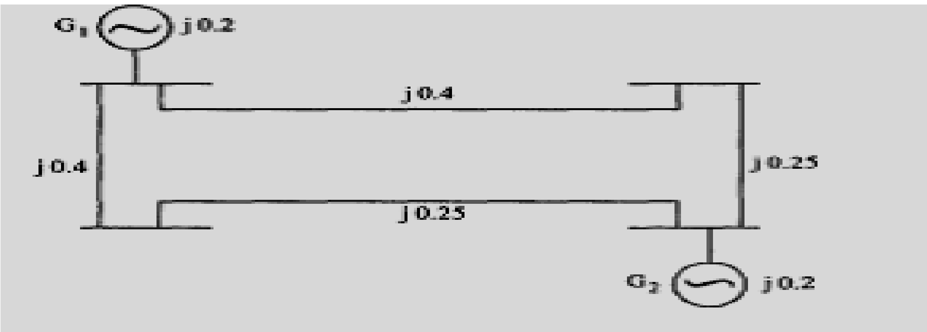
5. Derive the necessary expressions for building up of Z-bus when: [L3] [CO1][10M]

   (a) New element is added to Reference (b) New element is added between two existing buses.

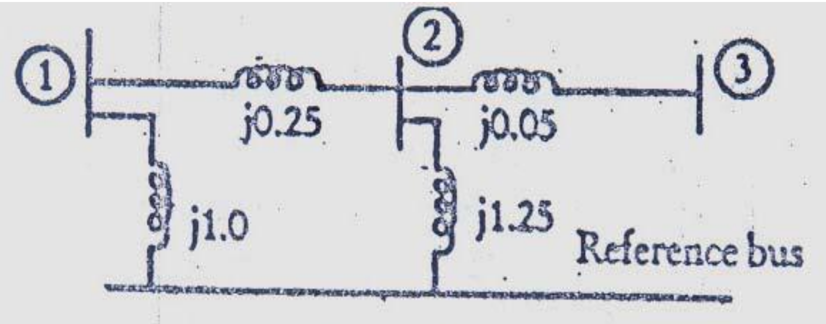
6. Derive the necessary expressions for building up of Z-bus when: [L3] [CO1][10M]

   (a) Element added between Old bus to Reference Bus (b) Element added between Two Old buses

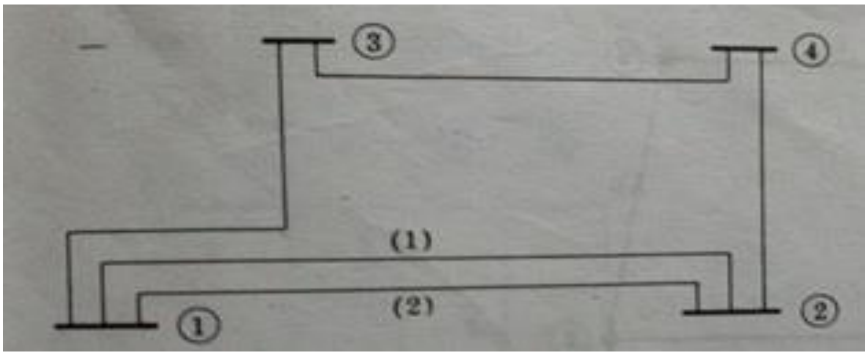
7. Form the Y_{BUS} by using singular transformation for the network shown below. Including the generator buses. [L3][CO1][10M]



8. Find the bus impedance matrix for the system whose reactance diagram as shown below. All the impedances are in p.u. [L3] [CO1][10M]



9. For the network shown below. Draw the Oriented graph from that find A^1, A. [L3] [CO1][10M]



10. (a)Derive the expression for Direct inspection method by using 3 Bus systems. [L3] [CO1][5M]

(b) Give the procedure for Formulation of Bus incidence Matrix. [L2][CO1][5M]

UNIT-II

SHORT CIRCUIT ANALYSIS

1. (a)What is per unit system? [L1][CO2][2M]

   (b) Define short-circuit KVA. [L1][CO2][2M]

   (c) Write any two advantages of per unit system. [L1][CO2][2M]

   (d)What are the types of reactors? [L1][CO2][2M]

   (e) Define positive and negative sequence components. [L1][CO2][2M]

2. (a) Explain about Short Circuit KVA and short-circuit current. [L2][CO2][5M]

   (b) Explain about types of reactors briefly. [L2][CO2][5M]

3. (a)Derive an expression for the fault current for the LG fault. [L3][CO2][5M]

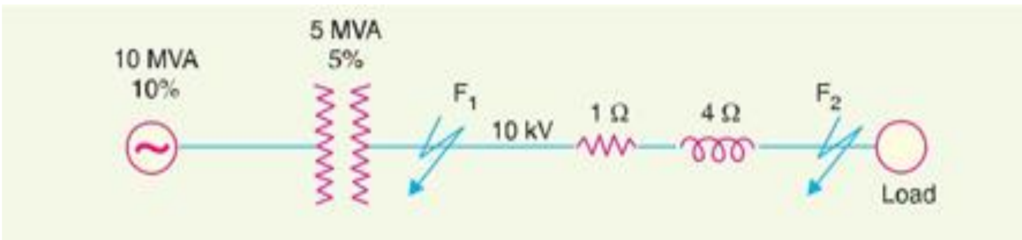
   (b).Derive an expression for the fault current for the LL fault [L3][CO2][5M]

4. Derive an expression for the fault current for the LLG &LLLG fault. [L3][CO2][10M]

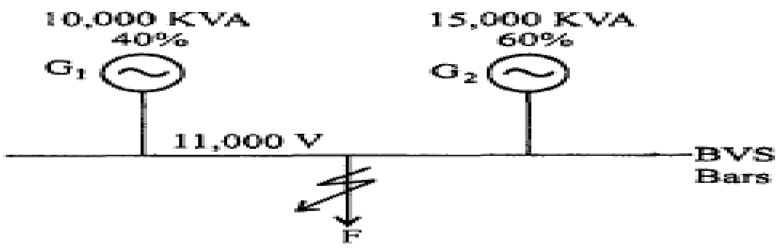
5. A 3-phase transmission line operating at 10 kV and having a resistance of 1Ωand reactance of 4 Ω is connected to the generating station bus-bars through 5 MVA step-up trans-former having a reactance of 5%. The bus-bars are supplied by a 10 MVA alternator having 10% reactance. Calculate the short-circuit 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. [L3][CO2][10M]



6. Consider the system shown in Fig below. 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. [L3][CO2][10M]



7. (a) state the advantages of Per Unit system. [L2][CO2][5M]

(b) Derive an expression for the fault current for the 3 ǿ fault. [L3][CO2][5M]

8. Discuss the principle of symmetrical components. Derive the necessary equations to convert:

(i) Phase quantities into symmetrical components.

(ii) Symmetrical components into phase quantities. [L3][CO2][10M]

9. (a) How are reactors classified? Explain the merits and demerits of different types of system protection using reactors. [L1][CO2][5M]

(b)Define per unit system and write equation for new base impedance? [L2][CO2][5M]

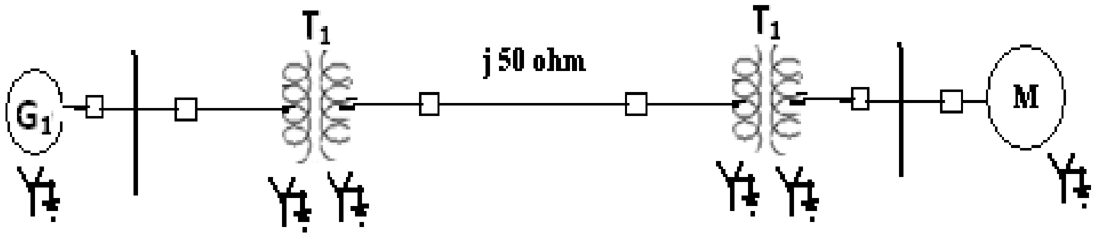
10. Draw the reactance diagram for the power system shown in fig. Neglect resistance and use a base of 100MVA, 220KV in 50KΩ line. The ratings of the generator motor and transformer are given below.

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

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

Y-Y Transformer: 40MVA, 33Y -220YKV, X=15%

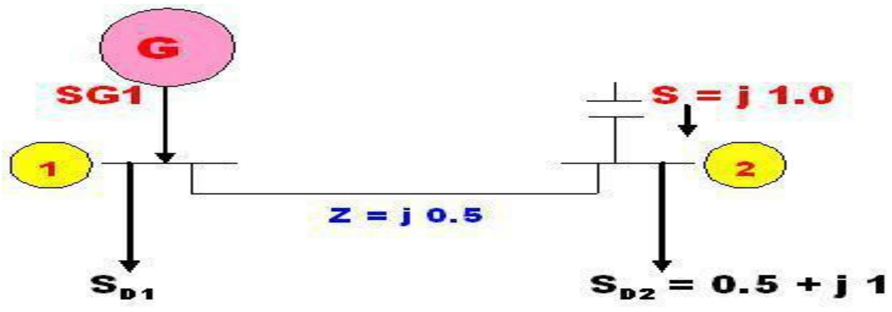
Y-Y Transformer: 30MVA, 11Y -220Y KV, X=15%. [L3][CO2] [10M]



UNIT-III

POWER FLOW STUDIES-I

1. (a) How many buses are there in a power system network? What are they? [L1][CO3][2M]
   (b) Write any two data, which are required for power flow studies. [L1][CO3][2M]
   (c) Define power flow studies. [L1][CO3][2M]
   (d) Mention the methods for load flow studies. [L1][CO3][2M]
   (e) What are the known and unknown quantities in PV-bus? [L1][CO3][2M]
2. (a) Derive and explain about static load flow equations. [L3][CO3][6M]
   (b) Explain the data for Load flow studies. [L3][CO3][4M]
3. Explain with a neat flow chart for Gauss-Seidel method without PV buses. [L3][CO3][10M]
4. Draw the flow chart for Gauss-Seidel method with PV buses and explain. [L1][CO3][10M]
5. write short notes on (i) Load Bus (ii) generator bus (iii) Slack bus [L1][CO3][10M]
6. (a) What is load flow analysis? What is the necessity for load flow studies? [L1][CO3][5M]
   (b) State limitations of Gauss Seidel method [L1] [CO3] [5M]
7. Obtain the voltage at bus 2 for the simple system shown in Figure, using the Gauss-Seidel method, if $V1 = 1\angle 0^0$ pu. [L3][CO3][10M]



8. (a)What is Acceleration factor and Explain its role gauss seidel method? [L1][CO3][5M]
   (b) State merits and demerits of Gauss seidel method. [L1][CO3][5M]
9. Write step by step algorithm for Gauss seidel method with PV buses. [L3][CO3][10M]
10. Explain the algorithm of Gauss seidel method without PV buses. [L2][CO3][10M]

UNIT-IV

POWER FLOW STUDIES-II

1. (a) Write any two difference between Gauss-seidel and Newton- raphson method. [L1][CO4][2M]

   (b)List the two comparisons between Decoupled and Fast-Decoupled method. [L1][CO4][2M]

   (c)What are the advantages of Newton-raphson method? [L1][CO4][2M]

   (d) List the advantages of Fast-De coupled method. [L1][CO4][2M]

   (e) Mention the disadvantages of Newton-raphson method. [L1][CO4][2M]

2. Write an Algorithm for N-R Rectangular Coordinate Method when PV Bus is absent. [L3][CO4][10M]

3. Draw a Flow Chart for N-R Rectangular Coordinate Method when PV Bus is absent. [L3][CO4][10M]

4. By Step by step algorithm for N-R Rectangular Coordinate Method when PV Bus is present. [L3][CO4][10M]

5. With neat sketch explain the Flow Chart for N-R Rectangular Coordinate Method when PV Bus is present. [L3][CO4][10M]

6. Develop an Algorithm for N-R Polar Coordinate Method when PV Bus is absent. [L3][CO4][10M]

7. Explain with a Flow Chart for N-R Polar Coordinate Method when PV Bus is absent. [L2][CO4][10M]

8. Write an Algorithm for N-R Polar Coordinate Method when PV Bus is present. [L3][CO4][10M]

9. (a) Explain about Decoupled Load Flow Method. [L2][CO4][5M]

   (b) List Comparison of Gauss-Seidel & Newton Raphson Method. [L3][CO4][5M]

10. (a) Explain about Fast Decoupled Load Flow Method. [L2][CO4][5M]

    (b) What are the Comparisons of Decoupled & Fast Decoupled Methods? [L1][CO4][5M]

UNIT-V

POWER SYSTEM STABILITY ANALYSIS

1. (a) Define critical clearing angle. [L1][CO5] [2M]

   (b)What are the different types of stability? [L1][CO5] [2M]

   (c) What is power angle curve? [L1][CO5] [2M]

   (d) Write down the Swing equation. [L1][CO6] [2M]

   (e) Define the term transfer reactance. [L1][CO5] [2M]

2. (a) State and derive swing equation. [L1][CO6] [6M]

   (b) What are the applications of equal area criterion? [L1][CO6] [4M]

3. (a) what is steady state stability and steady state stability limit. [L1][CO5][5M]

   (b) Discuss the various methods of improving steady state stability. [L1][CO5][5M]

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

   (a) The energy stored in the rotor at synchronous speed.

   (b)The rotor acceleration if the mechanical input is suddenly raised to 80MWfor an electric load 50MW.

   [L3][CO5][10M]

5. (a) What is critical clearing angle? Explain by using Swing curves. [L1][CO5][5M]

   (b) Derive an expression for critical clearing angle. [L3][CO5][5M]

6. (a) Explain the Factors effecting the Transient stability. [L2][CO5][5M]

   (b) What is stability? Explain different types of stabilities. [L1][CO5][5M]

7. Explain about steady-state stability power limit. [L2][CO5][10M]

8. (a)A Large generator is delivering 1.0pu power to an initiate bus through a transmission network. The maximum Power which can be transferred for pre fault, during fault and post fault conditions are 1.8p.u,0.4p.u and 1.3p.u respectively find the critical clearing angle. [L3][CO6] [5M]

   (b) 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. [L3][CO6] [5M]

9. (a) Derive and explain about Synchronous power coefficient. [L3][CO5][6M]

   (b)Define transfer reactance. [L1][CO5][4M]

10. (a) Explain about power angle curve. [L2][CO5][5M]

    (b) Discuss the various methods of improving transient state stability. [L1][CO5][5M]

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