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06EE71

Seventh Semester B.E. Degree Examination, June/July 2016
Computer Techniques in Power System Analysis

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. ***Assume missing data, if any suitably.***

PART – A

1 a. Explain with respect to linear graph theory, the terms given below : **(10 Marks)**
i) Loop and Basic Loop ii) Cutset and Basic cutest iii) Tree and Co - Tree.

b. For the network graph, with orientations for each of the elements as given in fig. Q1(b), obtain the incidence matrices $\hat{A}$, A, K, B, $\hat{B}$, C and $\hat{C}$. Chose node ⓪ as the reference key. Verify the answers obtained. **(10 Marks)**

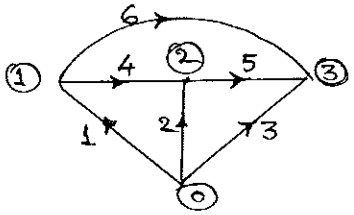


Fig.Q1(b)

2 a. Derive an expression for finding the bus admittance matrix, Y_{BVS} by the singular transformation analysis. **(08 Marks)**

b. The table Q2(b), below, gives a past of the line data of a 28 – bus system network. The parameters are in p.u. Find the element Y(20, 20) of the bus admittance matrix by the Rule of Inspection. **(06 Marks)**

'From' Node	'To' Node	R	X	B/2	Off Nominal Turns ratio, 'a'
20	8	0.02	0.06	j0.03	1.00
4	8	0.02	0.03	j0.10	1.00
20	4	0.06	0.18	j0.05	1.00
6	20	0	0.10	j0.00	0.95

c. The bus – impedance matrix of a 6 – node network with node – 1 as reference is as shown below. Assuming the values shown as p.u reactances, find the topology of the network and hence indicate the parametric values of all the elements by using the principle of Z_{BVS} building analysis. **(06 Marks)**

$$Z_{BVS} = j\begin{bmatrix} 2 & 0 & 0 & 0 & 2 \\ 0 & 2 & 0 & 2 & 0 \\ 0 & 0 & 2 & 0 & 0 \\ 0 & 2 & 0 & 3 & 0 \\ 2 & 0 & 0 & 0 & 3 \end{bmatrix}$$

3 a. Write brief explanatory note on the following :
i) Classification of buses for loud flow analysis.
ii) Significance and characteristic dimensions of Iterative methods of solution of (load flow) non linear equations.
iii) Need and significance of slack (or swing) bus during load flow analysis. **(12 Marks)**

b. List the algorithmic procedural steps of GS – LFA of a given system of 'n' buses, by giving the generalized expressions for the unknowns, that are used during iterations for determining the new estimates. **(08 Marks)**

4 a. Briefly explain the significance of TACOBIAN matrix of NR load flow analysis. **(06 Marks)**

b. For a 28 – bus system, with bus 28 as slack, buses 1 – 27 as PQ buses, determine the dimensions (order) of the NRLF Jacobian matrix. If now, the buses 20 to 27 are changed during iterative process, to PV type buses, determine the new order to the matrix. **(04 Marks)**

c. Write in brief on the following :
i) Merits of FDLF method ii) Comparison of GS and NR methods. **(10 Marks)**

PART – B

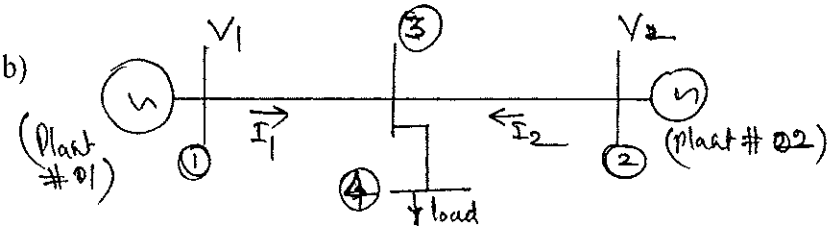
5 a. With reference to the economic operation of power system, explain the equal incremental cost criterion. Comment on the same, if the criterion has to include the effect of transmission line losses also. **(10 Marks)**

b. The fuel costs in Rs/hr for a 2 unit plant are given by :
$C_1 = 23.35 + 8.0P_1 + 0.004\ P_1^2$; $C_2 = 21.04 + 6.4P_2 + 0.0048P_2^2$.
Determine the economic operation schedule and the corresponding cost of generation if the maximum and minimum loading on each unit are 625 MW and 100MW respectively. The demand is 900 MW and the transmission losses are negligible. **(10 Marks)**

6 a. What are B-coefficients? Derive an expression for the B-coefficients in the standard algorithmic form. Hence arrive at the expression for the transmission loss coefficients for a three – bus system. **(12 Marks)**

b. For the system shown in the fig. Q6(b), obtain the loss coefficients. Assume that I_1 and I_2 are in phase. **(08 Marks)**

Fig.Q6(b)



7 a. Distinguish between the terms : i) Steady state stability and Transient stability ii) Angle stability and voltage stability. **(06 Marks)**

b. Write a note on the methods used to improve the transient stability margin. **(06 Marks)**

c. Comment on the performance of the various solution methods used for solving the swing equation. **(08 Marks)**

8 a. Explain in simple terms, the methods used to represent excitation governor control system for transient stability studies. **(08 Marks)**

b. Write a neat flow chart for transient stability studies using modified Euler's method. **(06 Marks)**

c. A 50 c/s, 4 role turbo alternator rated 20 MVA, 11KV has an inertia constant of H = 9 KWs/KVA. Find the acceleration if the input less the rotational losses is 26,800 HP and the electrical power developed is 16MV. **(06 Marks)**

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