Code :RR320203

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III B.Tech II Semester(RR) Supplementary Examinations, April/May 2011
MODELING OF POWER SYSTEM COMPONENTS
(Electrical & Electronics Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks
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1. (a) For the given network draw the graph and tree. Write the cut set schedule, for a chosen tree branch set Figure 1.

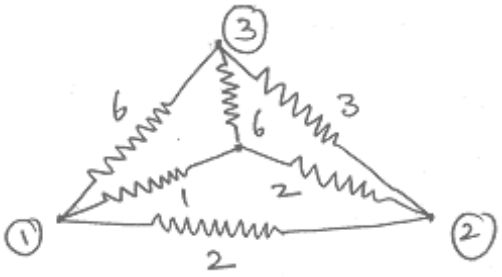

Figure 1:

(b) The incidence matrix for an oriented graph is given below. Draw the oriented graph.

Branches →

$$A=\begin{array}{c} \begin{matrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \end{matrix} \\ \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -0 & -1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & -1 & 1 & -1 \\ 0 & 0 & 0 & 1 & 0 & 0 & -1 & 0 \end{bmatrix} \end{array}$$

2. (a) Derive the expression for the loop impedance Z_{loop} using singular transformation in terms of primitive impedance matrix z and the basic loop incidence matrix C.
   (b) Derive an expression for Z_{loop} for the oriented graph shown in Figure 2below.

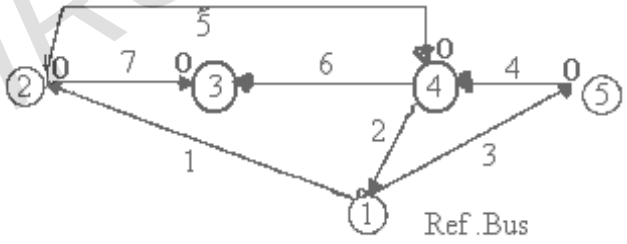

Figure 2:

3. Describe the procedure of modification of Zbus by adding mutually coupled branch from existing buses (p) and (k).
4. Describe the method for formation of Ybus by singular transformation using suitable example.
5. Develop the expressions for formation of three phase Z_{BUS} for the element which is added between two existing buses in a partial network.
6. Derive the relevant models for steady state and transient modes of operation of synchronous generator with relevant phasor diagrams and equations. Take saliency into consideration.
7. (a) Why we need to maintain frequency and voltage of power system at rated values? If not, explain the consequences?
   (b) What are all the feed back control systems that are provided for a synchronous Generator? Explain their importance and how they are independent from each other.
   (c) Give a schematic diagram showing regulators of a turbo-generator.
8. Explain the functional blocks of Automatic voltage regulator.

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