Code: **17EEPC1T1**

I M.Tech-I Semester-Regular Examinations-February 2018

ADVANCED COMPUTATIONAL METHODS IN POWER SYSTEMS
(POWER SYSTEM & CONTROL)

Duration: 3 hours   Max. Marks: 60

Answer the following questions.

1. a) Explain the following terms with examples
      i) Incidence matrix   2 M
      ii) basic cut set matrix   2 M
      iii) basic loop   3 M
   b) Obtain the oriented graph for the system shown in
      Figure-1. Select any four possible trees. For a selected tree
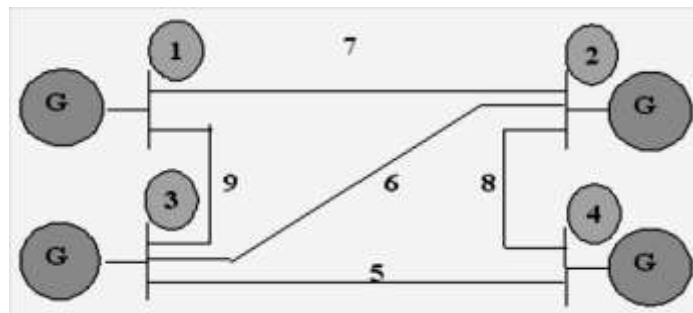   show the basic loops and basic cut-sets.   8 M

Figure-1

(OR)

2. a) 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

Z7=Z6=0.4 units, draw the corresponding oriented graph, and find the primitive network matrices. Neglect mutual values between the elements. 7 M

$$\hat{A} = \begin{array}{|c|c|c|c|c|}
\hline
1 & -1 & 0 & 0 & 0 \\
\hline
1 & 0 & -1 & 0 & 0 \\
\hline
1 & 0 & 0 & 0 & -1 \\
\hline
0 & 0 & 0 & -1 & 1 \\
\hline
0 & 0 & 1 & -1 & 0 \\
\hline
0 & 1 & -1 & 0 & 0 \\
\hline
0 & 0 & 1 & 0 & -1 \\
\hline
\end{array}$$

b) Derive Y_{BUS} and Y_{BR} using singular transformation method.

8 M

3. a) Obtain YBUS for the impedance network shown in figure by the rule of inspection. 8 M

(All are pu impedances)
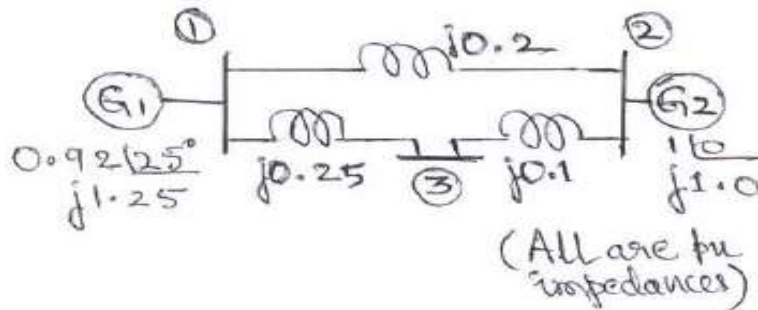
b) Derive the expression in polar form for the typical diagonal elements of the sub matrices of the Jacobian in NR method of load flow analysis. 7 M

(OR)

4. Explain with the help of a flow chart the computational procedure for load flow solution using G-S method, when all types of buses are included. 15 M

5. a) What are symmetrical faults? Explain their effect on power system. 7 M

   b) A synchronous generator, rated 500 KVA, 440 Volts, 0.1 pu sub-transient reactance is supplying a passive load of 400 KW, at 0.8 power factor (lag). Calculate the initial symmetrical RMS current for a three-phase fault at the generator terminals. 8 M

(OR)

6. a) Describe the determination of symmetrical fault current using Z_{BUS} inversion. 7 M

   b) A three phase 50 MVA, 11 kV generator is subjected to the various faults and the currents so obtained in each fault are: 2000 A for a three phase fault; 1800 A for a line-to-line fault and 2200 A for a line-to-ground fault. Find the sequence impedances of the generator. 8 M

7. a) Explain the procedural steps involved in Z_{bus} building algorithm for adding new bus to existing one. 7 M

   b) Describe the procedural steps involved in Z_{bus} building algorithm for addition and removal of lines in power system. 8 M

(OR)

8. What is contingency analysis? Explain the contingency analysis for multiple line system. 15 M