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10EE71

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Computer Techniques in Power System Analysis

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. With an explain and neat sketch explain the following :
i) Oriented graph ii) Tree iii) Co-tree iv) Tree branch path incidence matrix. **(10 Marks)**

b. For the network graph shown below, consider elements 1, 2, 3 as tree branches and node as reference and obtain :
i) Bus incidence matrix
ii) Branch path incidence matrix. There from show that $A_b K^T = I$.

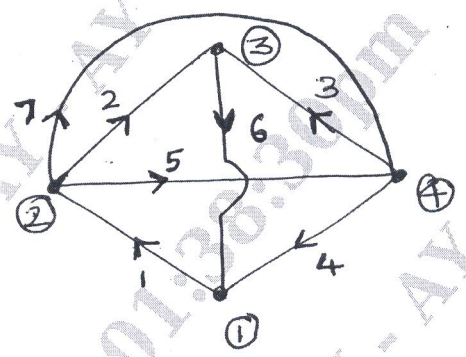

Fig.Q2(b) **(10 Marks)**

2 a. For the system line data given below, obtain the Y_{BUS} by singular transformation select bus 6 as reference bus and a tree with elements 6 and 7 as links. Verify the results obtained by the methods of inspection.

Line no.	1	2	3	4	5	6	7
Bus code p-q	1 – 6	2 – 6	2 – 5	1 – 3	3 – 4	4 – 5	3 – 6
Admittance in pu	30	45	20	10	25	15	35

(10 Marks)

b. Find Z_{BUS} for the system whose reactance diagram is shown below : All the impedances are marked in p.u.

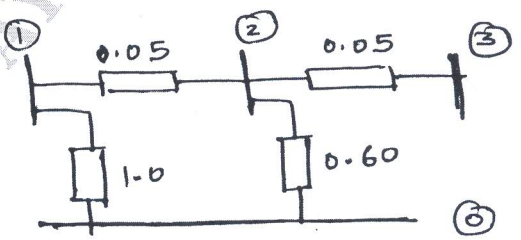

Fig.Q2(b) **(10 Marks)**

3 a. Explain the algorithm of Gauss Seidel Load Flow method for a power system having all types of buses. **(10 Marks)**

b. Following is the data of power system for load flow solution.

BUS codes	Line Data Admittance
1 – 2	2 – 8j
1 – 3	1 – 4j
2 – 3	0.666 – 2.664j
2 – 4	1 – 4j
3 – 4	2 – 8j

BUS Data

BUS code	P	Q	V	Remarks
1	–	–	1.06	Slack
2	0.5	0	1.04 + j0	PV
3	0.4	0.3	–	PQ
4	0.3	0.1	–	PQ

Reactive power constraint at bus 2 is $0.1 \le Q_2 \le 1.0$p.u. Determine the voltage at the end of first iteration using Gauss – Seidel method. Assume acceleration factor $\alpha = 1.6$. **(10 Marks)**

4 a. Explain with the help of algorithm the computational procedure for load flow solution using NR method, when the system is containing all types of buses. **(10 Marks)**

b. Compare Newton Raphson method, Gauss Seidel iterative method. **(06 Marks)**

c. Mention the approximations made FDLF method for load flow analysis. **(04 Marks)**

PART – B

5 a. Explain the method of equal incremental costs for the economic operation with the transmission losses considered. **(10 Marks)**

b. Two generators are coupled through a tie line. Load is at the bus of generator 2, it is known that a transfers of 100MW from generator 1 over the tie line means a transmission loss of 10WM. The incremental costs are

$$\frac{df_1}{dP_1} = 0.02P_1 + 16 \qquad \frac{dF_2}{dP_2} = 0.04P_2 + 20$$

Find the optimum schedule, total generation and demand if $\lambda = 25$Rs/Mwh. **(10 Marks)**

6 a. What are transmission loss coefficients obtain the general expression of Bmn with usual notations. **(10 Marks)**

b. Explain the mathematical formulation and solution procedure of optimal scheduling of hydro-thermal plants. **(10 Marks)**

7 a. Explain various methods employed for improving the transient stability. **(10 Marks)**

b. Explain method of finding the transient stability of a given power system using Milne's predictor corrector method. **(10 Marks)**

8 a. Consider the system having following parameters :
$P_m = 3.0$pu ; $\gamma_1 P_m = 1.2$pu ; $v_2 P_m = 2.0$, $H = 3.0$; $f = 60$Hz, $\Delta t = 0.02$sec, $p_e = 1.5$pu. Determine rotor angle and angular frequency at the end of 0.2 seconds using modified Euler's method. **(10 Marks)**

b. Explain the representation the following for power system stability studies
i) Exciters (Type 1 system) ii) Governors. **(10 Marks)**

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