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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Seventh Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; Dec - 2019

Computer Techniques in Power System

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

UNIT - I

1 a. Explain the significance of primitive network and hence get the performance equations in both impedance and admittance form. 6

b. For the graph given below, find the matrix-B in Fig. 1(b). Choose elements (5, 6, 7) as links. 6

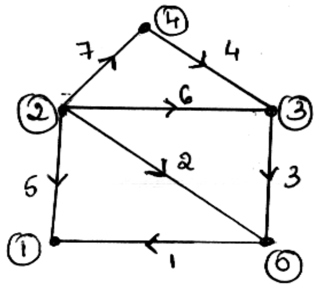

Fig. 1b.

c. With a neat sketch, define; 8

i) Branch and Link ii) Tree and Co-tree iii) Basic loops and Basic cut sets

2 a. For the sample power system shown, obtain the matrices $\hat{A}$, A, B, $\hat{B}$, C, $\hat{C}$ and K refer Fig. 2a. 10

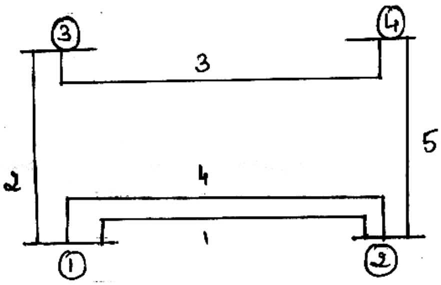

Fig. 2a

b. Explain with examples; 6

i) Basic loop incidence matrix ii) Branch path incidence matrix

c. Find matrix 'C' choosing (1, 7, 3) as links shown in Fig. 2C 4

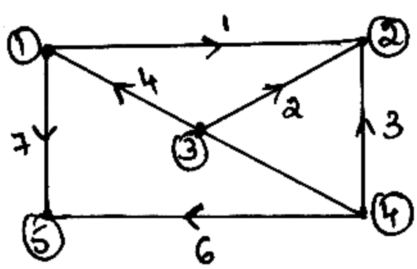

Fig. 2C

Contd…2

UNIT - II

3 a. Derive an expression for obtaining Y_{bus} using singular transformations. 8

b. For the network shown in Fig. 3b form primitive matrices [z] and [y] and obtain bus admittance matrix by singular transformation. Data is given in table. 12

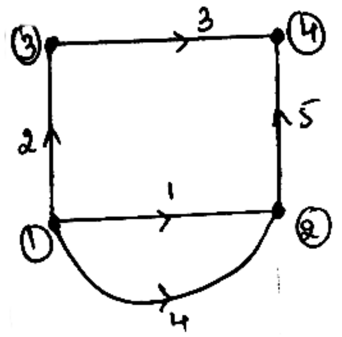

Fig. 3b

Elements	Self Impedance	Mutual Impedance
1	j 0.6	-
2	j 0.5	j 0.1 (with 1)
3	j 0.5	-
4	j 0.4	j 0.2 (with 1)
5	j 0.2	-

4 a. Find the bus admittance matrix for circuit shown in Fig. 4a by inspection method. 5

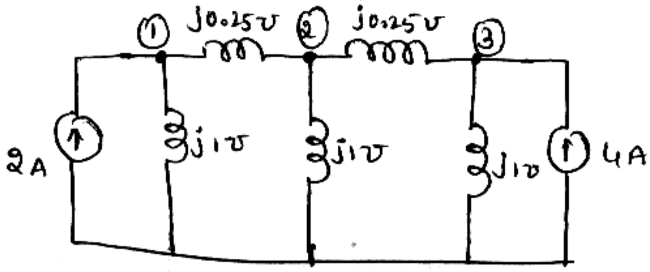

fig. 4a

b. Obtain the equivalent circuit of the tap changing transformer having off nominal turn's ratio '*a*'. 5

c. Obtain general expressions for Z_{bus} building algorithm when a branch is added to the partial network. 10

UNIT - III

5 a. Obtain the voltage at all buses for the three bus system shown in Fig. 5a at the end of first iteration by NR method. 14

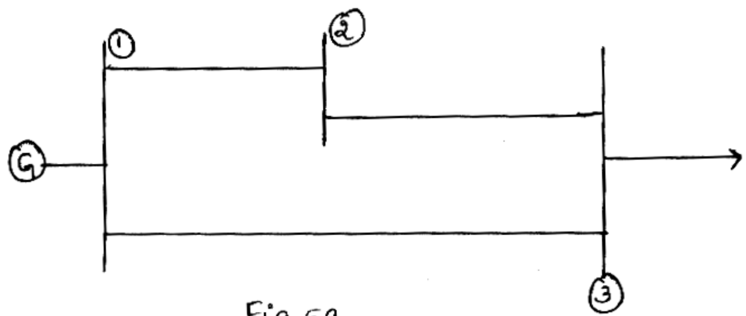

Fig. 5a

SB	EB	R (p.u)	X (p.u)	Bc/2
1	2	0	0.1	0
1	3	0	0.2	0
2	3	0	0.2	0

Bus Data:

Bus No.	P_G	Q_G	P_L	Q_L	V_{SP}
1 (Slack)	-	-	-	-	1.0
2 (PV)	5.3217	-	-	-	1.1
3 (PQ)	-	-	3.63	0.5339	-

b. Compare Newton Raphson and Gauss Siedel methods for load flow analysis. 6

6 a. Using the generalized algorithmic expression for each case of analysis, explain the load flow studies procedure as per Gauss Siedel method for power system having PQ and PV buses. 10

b. What is load flow analysis? Explain how the buses are classified to carry out load flow analysis in power systems. 6

c. Write a note on Fast decoupled load flow analysis. 4

UNIT - IV

7 a. Explain the mathematical formulation and solution procedure of optimal scheduling for power plants drive the necessary equation. 10

b. The fuel cost function of 2 units in $ / MWh are, $F_1 = 320 + 6.2\ Pg_1 + 0.004\ P^2_{g1}$, $F_2 = 200 + 6\ Pg_1 + 0.003\ P^2_{g2}$. Where Pg_1 and Pg_2 are in MW. The real power loss is given by $P_L = 0.0125\ (Pg_1)^2 + 0.00625\ (Pg_2)^2$ where the loss co-efficient are in p.u. on a 100 MVA base. If the demand is 412.35 MW, find the optimal schedule. 10

8 a. Explain the performance curves of thermal plant. 8

b. What are transmission line coefficients? Obtain the general loss coefficient formula with usual notations. 12

UNIT – V

9 a. Explain the point by point method of solving the swing equation. 10

b. With the help of flow chart and equation, explain the transient study analysis using modified Euler's method. 10

10 a. Explain Runge Kutta method for the solution of swing equation. 10

b. Explain Milne's predictor corrector method of solving the differential equation. 10

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