CBCS SCHEME

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15EE71

Seventh Semester B.E. Degree Examination, Aug./Sept. 2020
Power System Analysis - II

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define the following terms with an example:
(i) Oriented graph (ii) Tree (iii) Co-tree **(06 Marks)**

b. Fig. Q1 (b) shows a three bus power system, using Gauss-Seidal method determine the bus voltages at the end of first iteration. The values shown are line impedance in p.u.. Bus data are given in Table Q1 (b). **(10 Marks)**

Table Q1 (b)

Bus	Generation		Load		Voltage
	P_G(P.u)	Q_G(P.u)	P_D(P.u)	Q_D(P.u)	
1	-	-	-	-	$1.05\angle 0^0$
2	3	-	-	-	1.0
3	-	-	4	2	-

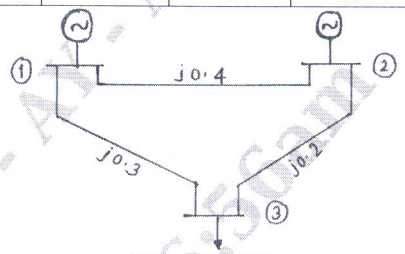

Fig. Q1 (b)

OR

2 a. With the help of singular transformation method, determine the bus admittance matrix Y_{bus} for the power system whose oriented graph is shown in Fig.Q2 (a). Element number and self impedance of the elements in p.u. are karked on the diagram. Neglect mutual coupling. **(08 Marks)**

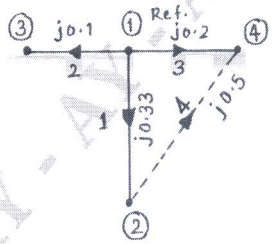

Fig. Q2 (a)

b. Explain the classification of different types of buses considered during power system load flow analysis. Discuss the need of slack bus in such an analysis. **(08 Marks)**

Module-2

3 a. Discuss clearly the significance and properties of Jacobian matrix as applied to load flow analysis. **(06 Marks)**

b. Stating all assumptions, deduce the FDLF model. Explain the step by step procedure for load flow solution using FDLF method. **(10 Marks)**

OR

4 a. Discuss the alogirhtm procedure for load flow analysis using Newton-Raphson's method in polar coordinates. Mention the conditions under which N-R method is superior over G-S method for load flow analysis. **(10 Marks)**

b. Explain any two methods of voltage control in power system. **(06 Marks)**

Module-3

5 a. Derive an expression for economical load schedule for an n-plant system neglecting the transmission losses and hence show that plant incremental cost is given by, $\lambda = \dfrac{P_D + \sum_{i=1}^{n} \frac{b_i}{2C_i}}{\sum_{i=1}^{n} \frac{1}{2C_i}}$

where, P_D is load demand in MW, b_i and c_i are coefficients of cost function. **(10 Marks)**

b. State unit commitment problem. In brief explain dynamic programming method. **(06 Marks)**

OR

6 a. Write down the transmission loss formula. Obtain the loss co-efficient formula for a system consisting of two generating plants for supplying several loads through a transmission line network. **(08 Marks)**

b. Briefly explain the two state generator models. With usual notation derive the expression for availability and unavailability in terms of failure and repair rate. **(08 Marks)**

Module-4

7 a. Explain the problem formulation and solution procedure of optimal scheduling for hydrothermal plants. **(09 Marks)**

b. Explain the state space method used for power system reliability evaluation. Explain Loss Of Load Probability (LOLP). **(07 Marks)**

OR

8 a. Write x flow chart for the optimal load flow solution. **(08 Marks)**

b. Define energy management system. Explain the major functions that are carried out in an energy control center of power system security. **(08 Marks)**

Module-5

9 a. Form Z_{bus} using building algorithm of the power system shown in Fig. Q9 (a). Self impedances of the elements are given in Table Q9 (a). Take element-3 as link and bus-1 as reference bus. **(08 Marks)**

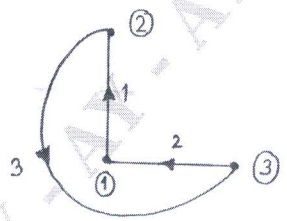

Fig. Q9 (a)

Table Q9 (a)

Element No.	1	2	3
Self impedance $Z_{pq\,pq}$	j0.5	j0.25	j0.3

b. Explain the point by point method of solving the swing equation. **(08 Marks)**

OR

10 a. Obtain the generalized algorithm expression for bus impedance matrix elements when a link is added to the partial network. Also discuss the special cases. **(08 Marks)**

b. Illustrate clearly the steps involved solving swing equation using Runge-Kutta method for transient analysis. **(08 Marks)**

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