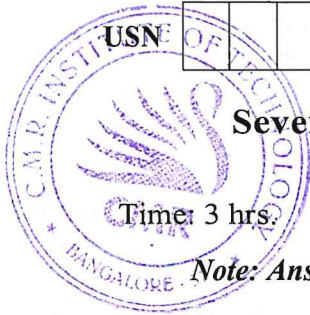


CBCS SCHEME

15EE71



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

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	-	-	-	-	$1.05 \angle 0^\circ$
2	3	-	-	-	1.0
3	-	-	4	2	-

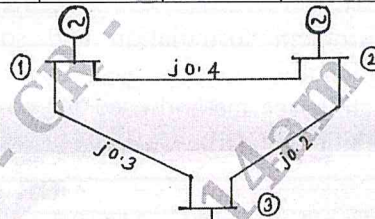


Fig. Q1 (b)

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)

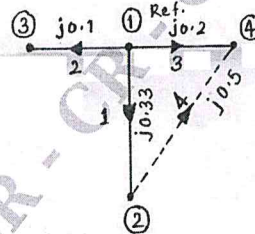


Fig. Q2 (a)

- 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)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

CMRIT LIBRARY
BANGALORE - 560 037

OR

- 4 a. Discuss the algorithm 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, $\lambda = \frac{P_D + \sum_{i=1}^n \frac{b_i}{2C_i}}{\sum_{i=1}^n \frac{1}{2C_i}}$
- 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 a 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)

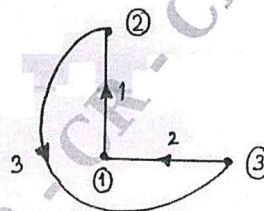


Fig. Q9 (a)

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)
