CBCS SCHEME

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15EE71

Seventh Semester B.E. Degree Examination, Jan./Feb.2021
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. What is primitive network? Explain its significance. **(06 Marks)**

b. The impedance data for a sample power system is given below. Find the admittance matrix of the system in bus frame of reference by singular transformation method. (Using ground as reference) **(10 Marks)**

Bus code	Impedence	Line Charging admittance
1 – 2	0.08+j0.24	0.0
1 – 3	0.02+j0.06	0.0
2 – 3	0.06+j0.18	0.0

OR

2 a. Define subgraph, tree, co-tree as applied to graph theory. Give example for each. **(06 Marks)**

b. Using Gauss-Seidel load flow method, find bus voltage at the end of one iteration for the system shown in Fig. Q2 (b). Ignore resistance and line changing.
Assume initial voltage at all buses to $1.0\angle 0^\circ$. Use 1.0 as acceleration factor.
The bus data is given in the table below:

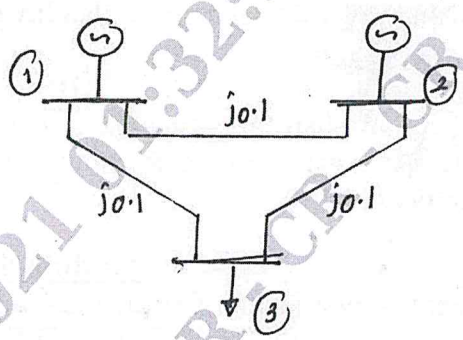

Fig Q2 (b)

Bus data table

Bus No.	Specified P (PU)	Injection Q (PU)	Specified voltage (PU)
1	-	-	1.0
2	0.3	-	1.0
3	0.5	0.2	-

(10 Marks)

Module-2

3 a. Explain the algorithmic procedure for load flow analysis using Newtonian Raphson's method in polar co-ordinates. **(08 Marks)**

b. List the advantages and limitation of Gauss-Seidel method and Newton-Raphson's of load flow analysis. **(08 Marks)**

OR

4 a. Explain the step by step procedure of fast decoupled load flow analysis and the assumptions made. **(08 Marks)**

b. Explain any two methods of voltage control in power system. **(08 Marks)**

Module-3

5 a. Explain the following with respect to optimal operation of power system:

(i) Input-output curve.
(ii) Cost-curve.
(iii) Incremental cost curve.
(iv) Heat rate curve. **(08 Marks)**

b. The incremental fuel costs in ruppes/Mwh for a plant consisting of two units are given by,

$$\frac{dC_1}{dP_1} = 0.16P_1 + 30$$

$$\frac{dC_2}{dP_2} = 0.20P_2 + 25.$$

Assume that both units are operating all the time throughout the year. The maximum and minimum loads on each unit are 200 MW and 50 MW respectively. If the load varies between 100 MW and 400 MW, find the load division between two units as the system load varies over the full range in steps of 100 MW. **(08 Marks)**

OR

6 a. Derive the exact co-ordination equation for economic load dispatch in a thermal power system with the consideration of transmission losses. **(08 Marks)**

b. Explain unit commitment using dynamic programming method. **(08 Marks)**

Module-4

7 a. Discuss in detail optimal scheduling for Hydrothermal system. **(08 Marks)**

b. Clearly explain availability and un-availability of reliability consideration. **(08 Marks)**

OR

8 a. Explain with a flow chart for optimal load flow solution. **(08 Marks)**

b. Explain state space method used for power system reliability evaluation. Discuss Loss Of Load Probability (LOLP). **(08 Marks)**

Module-5

9 a. For the system shown in Fig. Q9 (a) with bus 1 as reference and line data impedance as shown. Compute Z_{bus} by adding 1-2, 2-3 and 1-3. **(08 Marks)**

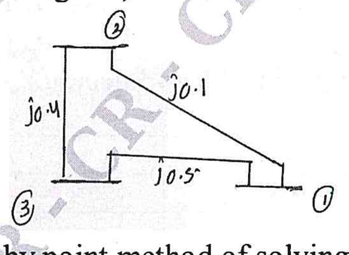

Fig. Q9 (a)

b. Discuss in detail the point by point method of solving the SWING EQUATION. **(08 Marks)**

OR

10 a. Discuss the various steps for determining multi machine stability of power system. **(08 Marks)**

b. Derive the generalized algorithm for finding the elements of bus impedance matrix when a branch is added to the partial network. Discuss the special cases. **(08 Marks)**

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