CBCS SCHEME

USN | | | | | | | | | | |

21EE62

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Power Systems Analysis – II

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. What is primitive network? Explain its two forms. **(06 Marks)**

b. With an example, explain tree and basic cut sets in network topology. **(06 Marks)**

c. Including the generator buses, form an Y_{BUS} using singular transformation for the below network.

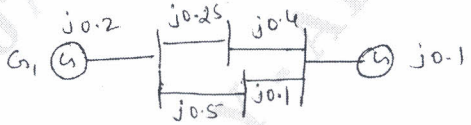


Fig.Q1(c) **(08 Marks)**

OR

2 a. Explain with an example : i) Co-tree ii) Incidence matrix. **(06 Marks)**

b. Derive an expression for bus admittance matrix using singular transformation method. **(06 Marks)**

c. For the system given below, obtain Y_{BUS} using inspection method. Consider bus 1 as reference and all impedance values are in pu.

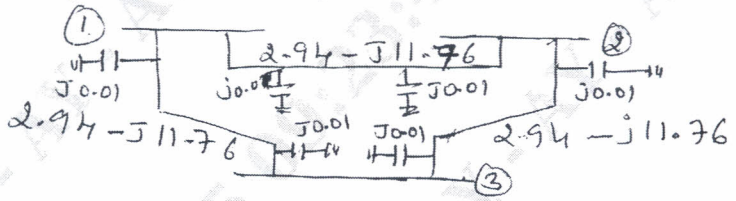


Fig.Q2(c) **(08 Marks)**

Module-2

3 a. Explain the classification of buses in load flow analysis. **(06 Marks)**

b. Explain the operating constraints in load flow studies. **(06 Marks)**

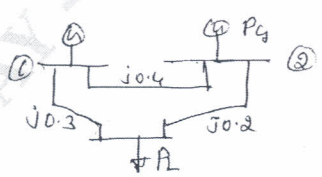
c. With the help of flow chart, explain Gauss-Seidel iterative method for load flow solution. **(08 Marks)**

OR

4 a. Derive the power flow equation for load flow studies. **(06 Marks)**

b. Explain the system data required for load flow studies. **(06 Marks)**

c. For all network given below, calculate the bus voltage 'V_2' after first iteration using Gauss–Seidel method. All impedance values are in pu. **(08 Marks)**



Bus Data
Bus 1 1.05∠0 pu
Bus 2 |V| = 1pu Pg = 3pu
Bus 3 PL = 4pu QL = 2pu

Fig.Q4(c)

Module-3

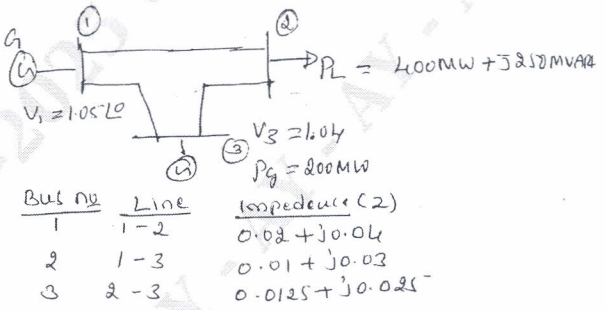
5 a. Discuss the algorithm procedure for load flow analysis using Newton-Raphson method in polar form. **(10 Marks)**

b. Write down the comparison between Gauss-Seidel Newton-Raphson and Fast decoupled methods. **(10 Marks)**

OR

6 a. With a flow chart, explain the algorithm of fast decoupled load flow method. **(10 Marks)**

b. Solve the load flow of the power system shown below using FDLF method.



Bus no	Line	Impedance (Ω)
1	1-2	0.02 + j0.04
2	1-3	0.01 + j0.03
3	2-3	0.0125 + j0.025

Fig.Q6(b) **(10 Marks)**

Module-4

7 a. Write a brief note on performance curves of thermal power plant for economic load analysis. **(06 Marks)**

b. Explain the constraints related to unit commitment in the power system. **(06 Marks)**

c. The cost characteristics of two unit in a plant are :

$C_1 = 0.4\ P_1^2 + 160\ P_2 + K_1$ Rs/h

$C_2 = 0.45\ P_2^2 + 120\ P_2 + K_2$ Rs/h

Where 'P1' and 'P2' are o/p power in 'MW'. Find the optimal load allocation between the two units when the total load is 162.5MW. What will be the daily loss if the units are loaded equally? **(08 Marks)**

OR

8 a. With the help of flow chart, explain forward dynamic programming approach to solve unit commitment problem. **(08 Marks)**

b. Derive the expression for economic load schedule for 'n' plant system by neglecting the transmission losses and generation limits. **(06 Marks)**

c. Obtain a priority list for the following data pertaining to three units in a plant.

Unit 1 : Max 600 MW

$C_1 = 5610 + 79.2\ P_1 + 0.01562\ P_1^2$ Rs/h

Unit 2 : Max 400 MW

$C_2 = 3100 + 78.5\ P_2 + 0.0194\ P_2^2$ Rs/h

Unit 3 : Max 200 MW

$C_3 = 936 + 95.64\ P_3 + 0.0578\ P_3^2$ Rs/h. **(06 Marks)**

Module-5

9 a. Explain point by point method to get numerical solution of swing equation. **(10 Marks)**

b. Explain the algorithm for short circuit analysis using bus impedance matrix. **(10 Marks)**

OR

10 a. Explain Runge-Kutta method of solving swing equation. **(10 Marks)**

b. Obtain a generalized algorithm for finding the elements of all bus impedance matrix when a branch is added. **(10 Marks)**

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