

GUJARAT TECHNOLOGICAL UNIVERSITY**BE – SEMESTER- VII EXAMINATION-SUMMER 2023****Subject Code: 2170901****Date: 30/06/2023****Subject Name: Interconnected Power System****Time: 10:30 AM TO 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Why bus admittance matrix is preferred over bus impedance matrix for power flow studies?	03
	(b) Derive static load flow equations	04
	(c) Explain equal area criteria for sudden increase in mechanical input to generator	07
Q.2	(a) An operator working at load dispatch center observes a continuous trend in grid frequency. What action should the operator takes if (1) the grid frequency is found to be decreasing from set value (2) the grid frequency is found to be increasing from set value	03
	(b) Discuss flat frequency method for frequency control	04
	(c) Explain the computational procedure for load flow analysis using Newton Raphson method	07
OR		
	(c) What are the steps required for formulating Z_{BUS} matrix. Derive mathematical formulation for modification in row and column elements of Z_{BUS} matrix when a link with some impedance is added between reference and existing bus	07
Q.3	(a) Discuss various methods to improve steady state stability	03
	(b) Explain Cascade tripping in power system	04
	(c) A synchronous generator is feeding 250 MW to a large 50 Hz network over a double circuit transmission line. The maximum steady state power that can be transmitted over the line when both the lines in operation is 500 MW and it is 350 MW when only one line is in operation. A solid three phase fault occurring at the network end of the lines causes it to trip. Find critical clearing angle	07
OR		
Q.3	(a) Define terms : (a) Graph (b) tree (c) co-tree	03
	(b) How Y_{BUS} is formed using singular transformation method	04
	(c) Explain the method of numerical solution of swing equation	07
Q.4	(a) Explain classification of power system stability	03

- (b) A power system has two generating stations and power is being dispatched economically with $P_1 = 150$ MW and $P_2 = 275$ MW. The loss coefficients are $B_{11} = 0.001$ MW⁻¹, $B_{12} = -0.0001$ MW⁻¹, $B_{22} = 0.0013$ MW⁻¹. Find the penalty factor of plant 1 04

- (c) Compare Newton Raphson (NR) method with Gauss-Seidel (GS) method 07

OR

- Q.4** (a) What do you mean by flat voltage start and what is importance of acceleration factor in load flow analysis? 03

- (b) Define (a) steady state stability (b) transient stability 04

- (c) Explain Tie line load bias control 07

- Q.5** (a) Classify various types of buses in power system for load flow analysis 03

- (b) Write short note on incremental rate curve 04

- (c) State and explain different methods of voltage control 07

OR

- Q.5** (a) Explain power angle curve 03

- (b) Discuss steps of blackstart 04

- (c) For the system shown in Fig 1, obtain V_2 , δ_2 after first iteration using Gauss-Seidel (GS) method. Given Bus 1 is slack bus, $V_1 = 1 \angle 0^\circ$, $P_2 - jQ_2 = -5.96 - j1.46$ and $|V_3| = 1.02$ and $\delta_3 = 0^\circ$. 07

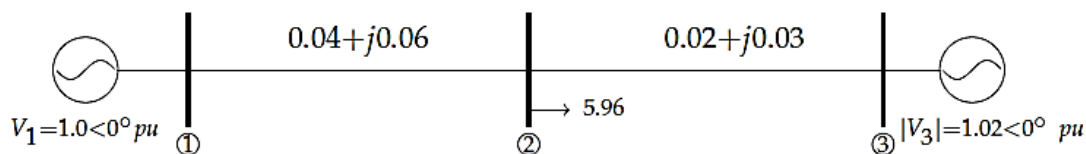


Fig 1
