

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering - SEMESTER - VII EXAMINATION - WINTER 2025

Subject Code: 2170901

Date: 28-11-2025

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) List out the functions of National Load Dispatch Center.	03
(b) Explain the concept of cascade tripping and black out in large size interconnected power system.	04
(c) Derive Static Load Flow Equations. Explain different type of buses used for load flow analysis.	07
Q.2 (a) Explain characteristics of Y-Bus Matrix.	03
(b) State and explain assumptions used in approximate load flow solution method.	04
(c) A network is shown in figure 1(a) with the values indicating impedance per unit. Its directed graph is shown in figure 1(b). Obtain the bus incidence matrix and primitive admittance matrices for the same and hence obtain Y-Bus matrix for the network.	07

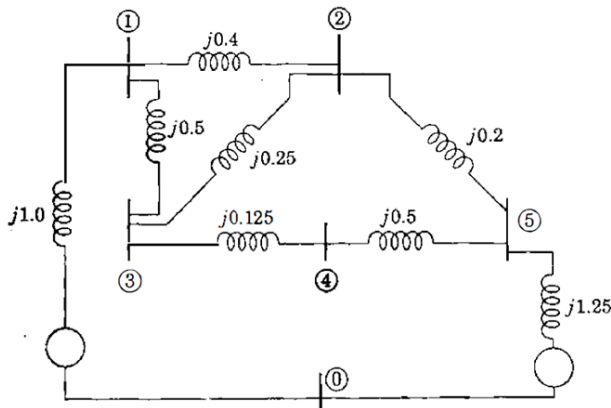


Fig. 1(a)

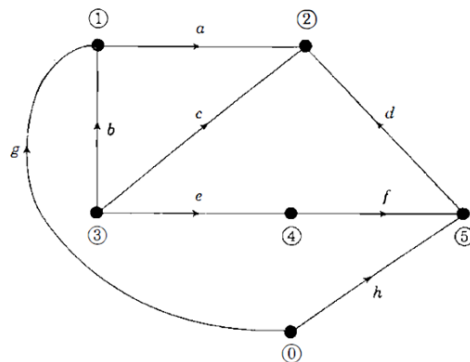


Fig. 1(b)

OR

(c) Explain modification of Z-bus Matrix when adding a new branch between: a) A new bus and reference node; b) A new bus and an existing bus; c) An existing bus and reference node; d) Two existing buses In each case, clearly indicate in what manner the existing Z-Bus matrix shall be modified.	07
Q.3 (a) Write a Short Note on Unit Commitment.	03
(b) Compare N-R method and FDLF method of Load Flow Studies.	04

- (c) Derive coordination equations for optimal operation of generating units and explain the iterative steps of obtaining solution for optimal generation. 07

OR

- (a) State advantages of interconnected power systems. 03
- (b) Give comparison of G-S and N-R methods of Load Flow Studies. 04
- (c) Derive expression for optimal generation scheduling for multiple plants when losses are taken into account. Clearly explain steps for obtaining solution of optimal generation scheduling problem. 07

- Q.4** (a) Explain the importance of voltage control in power system. 03
- (b) Explain how frequency and voltages are controlled in interconnected power system using P-f and Q-V control loops. 04
- (c) With the help of a neat diagram explain turbine speed governing system. Also derive its mathematical model. 07

OR

- (a) Explain the importance of frequency control in power system. 03
- (b) Explain Tie line load bias control in an interconnected power system. 04
- (c) Explain in detail, Equal Area Criterion and its application for transient stability analysis. 07

- Q.5** (a) Differentiate between steady state and transient stability. 03
- (b) Define critical clearing angle and transfer reactance and their significance in stability studies. 04
- (c) Enlist and explain various methods of voltage control in interconnected power system. 07

OR

- (a) Enlist various methods for improving transient stability of an interconnected power system. 03
- (b) Using dynamics of synchronous machine, derive the swing equation. 04
- (c) Enlist various methods for solution of swing equation and explain the Point by Point solution of swing equation in detail. 07
