Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – WINTER • 2014

Subject Code: 170807 Date: 29-11-2014

Subject Name: Power System Analysis

Time: 10:30 am - 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.**

Q.1 **(a)** In a three phase four wire system the currents in the lines a, b and c under abnormal conditions of loading were as follows: **07**

$I_a=100 \angle 30^o$ A, $I_b=50 \angle 300^o$ A, $I_c=30 \angle 180^o$ A

Calculate the zero, positive and negative phase sequence currents in line a and the return current in the neutral conductor.

(b) Prove that per unit impedance of transformer is the same whether computed from primary or secondary side. Draw per unit equivalent circuit of single-phase transformer. **07**

Q.2 **(a)** Explain Z_{bus} formulation using current injection technique. **07**

(b) Explain procedure of formation Y_{bus} using singular transformation. Derive the necessary equations. **07**

OR

(b) Explain the computation procedure of load flow by Fast decoupled load flow method. **07**

Q.3 **(a)** Derive the swing equation of a synchronous machine swinging against an infinite bus. **07**

(b) Derive expression for sequence impedances of a transmission line and draw their sequence networks. **07**

OR

Q.3 **(a)** Explain point by point method for solving swing equation. **07**

(b) Explain in detail "phase shift in star delta transformer" for positive and negative sequences voltages. **07**

Q.4 **(a)** Describe briefly the principle of operation of load dispatch organization coordinating different types of power plants in a power system. **07**

(b) What are the conditions to be satisfied before a 3-phase alternator is synchronized to infinite bus bars? **07**

OR

Q.4 **(a)** What is economics dispatch? Derive condition for economics dispatch when generating stations are connected in parallel. **07**

(b) Discuss the effect of speed-load characteristics of the prime movers on the load sharing of two alternators connected in parallel. **07**

Q.5 **(a)** Explain double line-to-ground fault. Write terminal conditions at fault location. Derive expression of fault current and draw the connection of sequence networks. **07**

(b) Discuss the short circuit algorithm for large system. **07**

OR

Q.5 **(a)** Explain line-to-ground fault. Write terminal conditions at fault location. Derive expression of fault current and draw the connection of sequence networks. **07**

(b) A 50 MVA, 11 kV, 3-phase alternator was subjected to different types of faults. The fault currents were: 3-phase fault 1870 A, line to line fault 2590 A and single line to ground fault 4130 A. The alternator neutral is solidly grounded. Find the reactance value of the three sequence reactance of the alternator. **07**

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