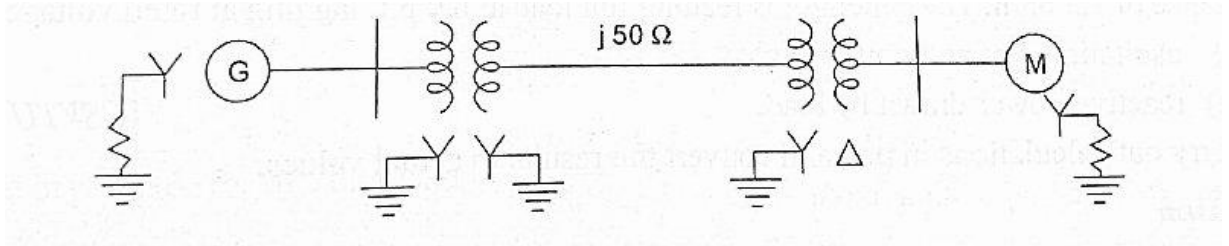


GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (OLD) - EXAMINATION – SUMMER 2017****Subject Code: 170807****Date: 29/04/2017****Subject Name: Power System Analysis (Department Elective - I)****Time: 02:30 PM to 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** Derive the expression for Z_{pu} new in terms of Z_{pu} old. **07**
- (b)** Figure shows a single line diagram of a power system. Draw impedance diagram. **07**
 Choose a base of 100 MVA, 220 kV in 50 ohm line. Ratings of generators etc. are as under:
 Generator 40 MVA, 25 kV, $X'' = 20\%$
 Synch. motor 50 MVA, 11 kV, $X'' = 30\%$
 Y-Y transformer 40 MVA, 33/220 kV, $X = 15\%$
 Y-Delta transformer 30 MVA, 11/220 kV, $X = 15\%$



- Q.2 (a)** Explain the short circuit of a loaded synchronous machine. **07**
- (b)** Derive expression for sequence impedances of transmission line and draw their sequence networks. **07**

OR

- (b)** Derive fault current equation $I^f = V_r^0 / (Z_{rr} + Z^f)$ Using Z_{bus} Matrix when n bus system is given. (assume that the r^{th} bus is faulted) **07**
- Q.3 (a)** Explain in detail “phase shift in star delta transformer” for positive & negative sequence voltages. **07**
- (b)** Explain how an unbalanced set of three phase voltages can be represented by systems of balanced voltages. **07**

OR

- Q.3 (a)** Explain Single 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 per unit values of the three sequence reactance of the alternator. **07**

- Q.4 (a)** Derive the Static load flow equations. Explain in brief about the Classification of buses. **07**
- (b)** Explain and draw a flow chart for a load flow study on a power system having only P-Q buses using Gauss - Seidel Method. **07**

OR

- Q.4 (a)** Explain the reclosure case of equal area criterion, showing the critical clearing angle and angle of reclosure. **07**

- (b) Derive the Swing equation of a synchronous machine. **07**
- Q.5** (a) Describe the principle of operation of load dispatch organization coordinating different types of power plants in a power system. **07**
- (b) Find the steady state power limit of a system consisting of a generator equivalent reactance 0.50 pu connected to an infinite bus through a series reactance of 1 pu. The terminal voltage of the generator is held at 1.20 pu and voltage of the infinite bus is 1.0 pu. **07**
- OR**
- Q.5** (a) What are the conditions to be satisfied before a 3-phase alternator is synchronized to infinite bus bars? **07**
- (b) Explain the effect of increasing the excitation of one of the alternator. **07**
