Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – WINTER • 2014

Subject Code: 150902 **Date: 28-11-2014**

Subject Name: Power System Analysis and Simulation

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)**	Derive the equations of ABCD parameters for nominal π (pi) configuration of a transmission line from first principles with usual notations.	**07**
	(b)	Select a small power system of your choice. Show its single line diagram and then draw the corresponding PU impedance diagram.	**07**
Q.2	**(a)**	Discuss the advantages of PU system representation.	**07**
	(b)	A three phase 50 Hz transmission line is 150 Km long and delivers 25 MW at 220 KV at 0.8 p.f. lagging. The resistance and reactance of the line per conductor per km are 0.3 Ω and 0.9 Ω respectively. The line charging admittance is 0.3×10^{-6} ʊ/km/phase. Compute the voltage regulation and transmission efficiency by applying nominal π (pi) method.	**07**
		OR	
	(b)	Briefly explain the importance of power circle diagrams. Draw and explain the receiving end circle diagram for a transmission line.	**07**
Q.3	**(a)**	Explain the sub-transient, transient and steady state reactance of a synchronous machine in relation to fault current.	**07**
	(b)	With suitable example explain how the symmetrical fault analysis is useful for selection of circuit breakers.	**07**
		OR	
Q.3	**(a)**	What is bus impedance matrix? How it is useful in symmetrical fault analysis?	**07**
	(b)	A generator is rated 1000 MVA, 11 KV. Its star connected winding has reactance of 0.9 PU Find (1) Ohmic value of reactance (2) If the generator is working in a circuit for which the base values are specified as 250 MVA, 22 KV, find out its PU reactance on the specified base.	**07**
Q.4	**(a)**	Derive the equation of three phase power in terms of symmetrical components of voltages and currents.	**07**
	(b)	The currents in three phase unbalanced system are I_R = (12 + j6) A, I_Y = (12 - j12) A, I_B = (-15 + j10) A. The phase sequence is RYB. Calculate, positive, negative and zero sequence components of currents.	**07**
		OR	
Q.4	**(a)**	Mention the steps to find the fault current with LG fault in a power system. Draw the interconnection of sequence networks in this regard.	**07**

(b) Fig (A) shows a part of a power system. Draw zero sequence network for this system. The system data is given below: **07**

Generator (G1): 50 MVA, 11KV, X_0=0.08 PU
Transformer (T1): 50 MVA, 11/220 kV, X_0 =0.1 PU
Generator (G2) : 30 MVA, 11KV, X_0 =0.07 PU
Transformer (T2): 30 MVA, 220/11 KV, X_0 =0.09 PU
Zero sequence reactance of line is 555.6 Ω
Grounding reactance of G2 is 0.1 PU

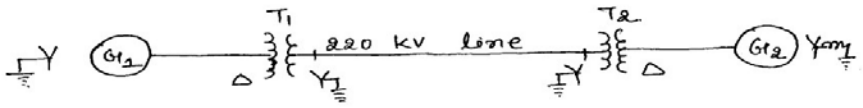

Fig (A)

Q.5 **(a)** Briefly discuss the factors affecting Corona. **07**
(b) With suitable example explain the single and double frequency transients in power system. **07**

OR

Q.5 **(a)** Derive the equation of critical disruptive voltage in relation to Corona discharge. **07**
(b) Write a short note on neutral grounding. **07**

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