Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–IV EXAMINATION – WINTER 2015

Subject Code:X40903 **Date:23/12/2015**

Subject Name: Power System Analysis and Simulation

Time: 02:30pm to 05:00pm **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 'T' configuration of a transmission line from first principles with usual notations.	**07**
	(b)	Mention the reasons why PU system is preferred for power system analysis.	**07**
Q.2	**(a)**	Take an example of your choice for a power system which has three generators, three transformers and three transmission lines. Draw its single line diagram and the corresponding PU impedance diagram.	**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} ℧/km/phase. Compute the voltage regulation and transmission efficiency by applying nominal π (pi) method.	**07**
		OR	
	(b)	Write a short note on receiving end power circle diagram.	**07**
Q.3	**(a)**	Draw and explain the waveform of short circuit current of an unloaded synchronous machine.	**07**
	(b)	Describe the procedure for symmetrical fault analysis.	**07**
		OR	
Q.3	**(a)**	Explain the method to determine ratings of circuit breaker using 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 equations of symmetrical components of voltages in terms of three phase voltages.	**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 LL 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

Zero sequence reactance of grounding resistor for G2 is 0.1 PU

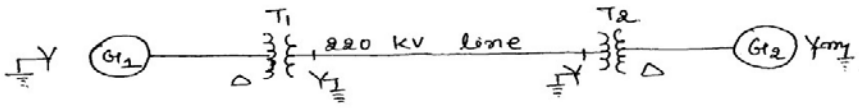

Fig (A)

Q.5 **(a)** Derive the equation of critical disruptive voltage in relation to Corona discharge. **07**

(b) With suitable example explain the single and double frequency transients in power system. **07**

OR

Q.5 **(a)** Write a short note on Corona and the factors affecting it. **07**

(b) Write a short note on neutral grounding. **07**

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