Sea	at No.: Enrolment No	Enrolment No	
Su	GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-V- EXAMINATION – SUMMER 2016 Ibject Code: 150902 Date: 21/05/20	)16	
Su Ti	bject Name: Power System Analysis and Simulation me: 02:30 PM to 05:00 PM Total Marks: 7	70	
Ins	<ol> <li>tructions:</li> <li>1. Attempt all questions.</li> <li>2. Make suitable assumptions wherever necessary.</li> <li>3. Figures to the right indicate full marks.</li> </ol>		
Q.1	(a) Derive the value of ABCD constants for nominal-T and nominal- $\pi$ representation of medium length transmission line	(8)	
	(b) State the advantages of per unit system	(6)	
Q.2	(a) Explain the concept of sub-transient, transient and steady reactance of synchronous machine. Also explain, why motors act as generators and feed the fault during the initial period of short circuit	(7)	
	<ul><li>(b) Draw zero sequence impedance diagrams for different types of transformer connections</li></ul>	(7)	
	OR I I I I I I I I I I I I I I I I I I I		
	(b) Derive the expression for fault current for a double line to ground fault. Also show the connection of sequence networks for the same	(7)	
Q.3	(a) Derive the expression for sending end voltage and current for a long transmission line	(7)	
	(b) The following data refers to a 3-phase overhead transmission line Voltage between the lines = $220 \text{ kV}$	(7)	
	Total series impedance per phase = $200 / \underline{80^{\circ}}$ ohms Total shupt impedance per phase = $0.0013 / 90^{\circ}$ mbos		
	Load delivered = 100 MW at 0.8 pf lagging		
	Using rigorous method, determine sending end voltage and sending end current OR		
Q.3	(a) With the help of vector diagram explain how power factor of a synchronous generator changes with change in excitation	(7)	
	<ul><li>(b) A delta connected resistive load is connected across a balanced three phase supply of 400 V as shown in figure 1. Find the symmetrical components of line currents and delta currents</li></ul>	(7)	
	$15 \Omega \neq 20 \Omega$		
	c /c b		



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B-

(a) A star connected generator feeds bus bar 1 of a power system. Bus bar 1 is Q.4

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250 Ω

(7)

connected to bus bar 2 through a star/delta transformer in series with a transmission line. The power network connected to bus 2 can be represented by star connected generator with equal positive and negative sequence reactances. All star points are solidly grounded. The p.u. reactances of various components are given below

	Positive	Negative	Zero
Generator	0.20	0.15	0.05
Transformer	0.12	0.12	0.12
Transmission line	0.30	0.30	0.50
Power network	Х	Х	0.10

Under no-load conditions, with 1.0 pu voltage at each bus-bar, a current of 4.0 p.u. is fed to a three phase short circuit on bus bar 2. Determine the positive sequence reactance X of the equivalent generator of the power network. For the same initial conditions, find the fault current for a single line to ground fault on bus bar 1

(b) Prove that zero sequence reactance of a transmission line is much higher than (7) positive or negative sequence reactance

## OR

	OK	
Q.4	(a) Explain the phenomena of corona in transmission lines	
	(b) Discuss how inductive interference takes place between power and communication lines.	(7)
Q.5	(a) Discuss the criteria for selection of circuit breakers	(7)
	(b) With the help of a neat diagram explain resistance grounding	(7)
	OR	
Q.5	(a) Prove that velocity of travelling wave in cable is less as compared to overhead lines	(7)
	(b) Derive the expression for co-efficient of reflection and refraction for voltage and current waves in case of overhead line terminated by resistance R. Assume surge impedance of line to be Z <sub>0</sub> .	(7)