Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – WINTER 2023

Subject Code:3150911 Date:20-12-2023

Subject Name: Power System- II

Time:10:30 AM TO 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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	What is BIL?	**03**
	(b)	What is arcing ground phenomenon?	**04**
	(c)	Discuss the phenomenon of wave reflection and refraction. Derive expression for reflection and refraction.	**07**
Q.2	**(a)**	What is meant by corona? Why does it occur?	**03**
	(b)	What is difference between visual critical voltage and disruptive critical voltage?	**04**
	(c)	Discuss in detail factors and conditions affecting corona loss.	**07**
		OR	
Q.2	**(c)**	A 3 phase overhead line has conductors of 30 mm diameter and arranged in the form of equilateral triangle. Assume fair weather conditions, air density factor of 0.95 and irregular factor of 0.95. Find minimum spacing between conductors if disruptive critical voltage is not to exceed 230 kV between lines. Breakdown strength of air is 30 kV/CM	**07**
Q.3	**(a)**	Differentiate between nominal T and equivalent T circuits.	**03**
	(b)	Why equivalent π circuit of a long line is preferred to the equivalent T circuit?	**04**
	(c)	Draw the phasor diagrams of nominal π circuit and nominal T circuit of a transmission line. Derive expressions for sending end voltage and current in each case.	**07**
		OR	
Q.3	**(a)**	What is Ferranti effect?	**03**
	(b)	Why representation of a line by lumped parameters gives inaccurate results for long lines?	**04**
	(c)	Starting from first principles deduce expression for ABCD constants for a long line in terms of its parameters. Define propagation constant and characteristic impedance.	**07**
Q.4	**(a)**	What is the difference between symmetrical and unsymmetrical faults?	**03**
	(b)	List the steps to calculations fault calculations.	**04**
	(c)	Calculate the sub transient fault current in each phase for a dead short circuit on one phase to ground at bus Q for the system shown in Fig. 1	**07**

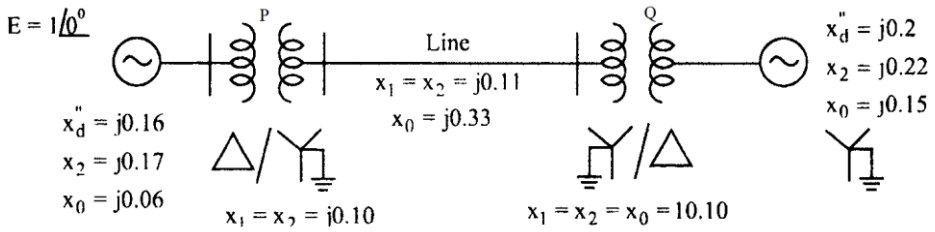

Fig. 1

All reactance are in p.u. on generator base.

OR

Q.4 **(a)** How can effect of load current can be taken in to account in fault calculation? **03**

(b) Write a short note on selection of circuit breaker. **04**

(c) Using appropriate interconnection of sequence networks, derive the equation for a line to line fault in a power system with fault impedance of Zf. **07**

Q.5 **(a)** Give classification of faults and discuss their nature of occurrence. **03**

(b) Derive necessary equations to convert (a) phase quantities into symmetrical components (b) symmetrical components in to phase quantity. **04**

(c) Discuss the significance of zero sequence circuit. Why should Zn appear as 3Zn in zero sequence equivalent circuit? **07**

OR

Q.5 **(a)** What are the symmetrical components and its need? **03**

(b) Draw zero sequence network of a three phase transformer with **04**
(1) Star-Star connection with both neutrals grounded
(2) Star delta connection with star side neutral grounded

(c) Find the symmetrical components for the given three phase currents **07**

$$I_a = 10\angle 0^\circ$$
$$I_b = 10\angle -90^\circ$$
$$I_c = 15\angle 135^\circ$$

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