

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER– V(OLD) EXAMINATION – SUMMER 2019****Subject Code:150902****Date:17/06/2019****Subject Name:Power System Analysis And Simulation****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) State and advantages of per unit system. **07**  
 (b) Derive the ABCD constants for nominal  $-\pi$  representation of medium length transmission line. **07**
- Q.2** (a) Explain Sub-Transient, Transient and Steady State reactance of synchronous machine. **07**  
 (b) Write a brief note on selection of circuit breaker. **07**
- OR**
- (b) A 50 Hz transmission line 300 km long has a total series impedance of  $(40 + j125)$  ohms and a total shunt admittance of  $10^{-3}$  mho. The receiving end load is 50 MW at 220 kV with 0.8 lagging power factor. Find the sending end voltage and current using exact method. **07**
- Q.3** (a) Derive the relationship between symmetrical components of line and delta currents. **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**
- OR**
- Q.3** (a) Derive the equation of the capacitance of a three phase line with equilateral spacing. **07**  
 (b) Explain 'type 2 modification' of Zbus building algorithm. **07**
- Q.4** (a) Derive an expression for the fault current for a double-line fault as an unloaded generator. **07**  
 (b) A synchronous generator is rated 25 MVA, 11 kV. It is star connected with neutral point solidly grounded. The generator is operating on no-load at rated voltage. Its reactances are  $X'' = X_2 = j0.20$  pu and  $X_0 = j0.08$  pu. Calculate the symmetrical sub transient line current for (i) LG fault (ii) LL fault (iii) LLG fault (iv) LLL fault **07**
- OR**
- Q.4** (a) Explain the need of neutral grounding of system. Describe any one method of neutral grounding. **07**  
 (b) Discuss corona formation phenomenon. **07**
- Q.5** (a) Derive the equation for attenuation of a travelling wave. **07**  
 (b) A 500 kV,  $2\mu\text{S}$ , rectangular surge travels along the line which is terminated by a capacitance of 2500 pF. Determine the voltage across the capacitance and the reflected voltage wave if the surge impedance is  $400\Omega$ . **07**

**OR**

- Q.5** (a) What is bus impedance matrix? How it is useful in symmetrical fault analysis? **07**  
(b) Briefly explain the importance of power circle diagrams. Draw and explain the receiving end circle diagram for a transmission line. **07**

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