

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI (NEW) EXAMINATION – WINTER 2018

Subject Code:2160908

Date:20/11/2018

Subject Name:Electrical Power system – II

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) Explain Types of Transmission Line. **03**
 - (b) Obtain the Equivalent circuit for nominal-T representation for long transmission line. **04**
 - (c) A 3 phase 220 Kv, 50 Hz transmission line consists of 1.5 cm radius conductor spaced 2 meters apart in equilateral triangular formation. If the temperature is 40° C and atmospheric pressure is 76 cm, calculate the corona loss per km of the line. Take $m_0 = 0.85$. **07**

- Q.2**
- (a) How do the term impedance drop, voltage drop and voltage regulation, in connection with transmission line differs? **03**
 - (b) Prove that in case of transients in RL series circuits, short circuit current contains symmetrical short circuit components and DC offset components. **04**
 - (c) Explain Symmetrical components and state their application. Derive Symmetrical components of a given set of three unbalanced current phasors. **07**

OR

- (c) A 3-phase. 50-Hz overhead transmission line 100 km long has the following constants. **07**
Resistance/km/phase = 0.1Ω
Inductive reactance/km/phase = 0.2Ω
Capacitive susceptance/km/phase = 0.04×10^{-4} siemen
Determine (i) the sending end current (ii) sending end voltage (iii) sending end power factor and (iv) transmission efficiency when supplying a balance load of 10,000 kW at 66 kV p.f 0.8 lagging . Use nominal T method.

- Q.3**
- (a) What is arcing ground? Explain its effect on the performance of a power system. **03**
 - (b) Write a note on selection of circuit breaker. **04**
 - (c) The currents in a 3-phase unbalanced system are : $I_R = (12 + j 6) A$; $I_Y = (12 - j 12) A$; $I_B = (-15 + j 10) A$. The phase sequence in RYB. Calculate the zero, positive and negative sequence components of the currents. **07**

OR

- Q.3**
- (a) What is the reason for transient during short circuits? **03**

- (b) Explain Various factors affecting Corona effect. 04
- (c) Describe analysis of single line to ground fault at a point of power system using symmetrical components and sequence networks. 07
- Q.4** (a) Discuss phase shifting in star-delta transformers. 03
- (b) What is 3 phase unsymmetrical fault? Discuss any one type of unsymmetrical in brief. 04
- (c) With suitable example explain the single and double frequency transients in power system. 07

OR

- Q.4** (a) Explain Capacitance switching. 03
- (b) Differentiate between transient and sub transient reactance. 04
- (c) Explain travelling waves of a transmission line when the receiving end is short circuited. 07
- Q.5** (a) Explain the performance of loaded Synchronous Machine. 03
- (b) Explain why the control of reactive power is essential for maintaining a desired voltage profile? 04
- (c) An unloaded star connected solidly grounded 10 MVA, 11 kV generator has positive, negative and zero sequence impedances are $j1.3 \Omega$, $j 0.8 \Omega$ and $j 0.4 \Omega$ respectively. A single line to ground fault occurs at the terminals of the generator. 07
- 1) Calculate the fault current.
- 2) Determine the value of the inductive reactance that must be inserted at the generator neutral to limit the fault current to 50 % of the value obtained in (1)

OR

- Q.5** (a) Enlist the various unsymmetrical fault occurring in power system. 03
- (b) Explain importance of power circle diagram. 04
- (c) A generator rated 100 MVA, 20 kV has $X_1=X_2=20\%$ and $X_0=5\%$. Its neutral is grounded through reactor of 0.32Ω . The generator is operating at rated voltage with load and is disconnected from the system when a single line to ground fault occurs at its terminals. Find the subtransient current in the faulted phase and line to line voltages. 07
