

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER- V • EXAMINATION – WINTER 2016

Subject Code: 150902

Date: 02/12/2016

Subject Name: Power System Analysis and Simulation

Time: 10:30AM – 01:00PM

Total Marks:

70

Instructions:

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Symbols have their usual meanings**

Q.1

- (a) Derive the value of ABCD constants for a medium length line represented by nominal π model (7)
- (b) Derive the expression for sending end and receiving end complex power for a transmission line (7)

Q.2

- (a) With the help of phasor diagram, explain the working of synchronous generator feeding constant power as excitation is varied (7)
- (b) Explain how long transmission line can be represented by equivalent T-model (7)
- OR**
- (b) Explain what happens when short circuit occurs at the terminals of synchronous machine at no-load. Also plot the envelope of short circuit armature current and show subtransient, transient and steady state period (7)

Q.3

- (a) Draw and explain zero sequence reactance diagrams for different types of transformer connections (7)
- (b) Explain sequence impedance of transmission lines (7)
- OR**

Q.3

- (a) For the radial network shown in figure 1, find the fault current for 3- Φ fault at point F (7)
- (b) A delta connected balanced resistive load is connected across an unbalanced 3- Φ supply as shown in figure 2. Find the symmetrical components of line currents and delta currents (7)

Q.4

- (a) Derive the expression for fault current when a double line to ground fault occurs at the terminals of a synchronous machine (6)
- (b) Two 11 kV, 20 MVA, 3- Φ star connected generators operate in parallel. The (8)

positive, negative and zero sequence reactances are $j0.18$, $j0.15$ and $j0.10$ pu respectively. The star point of one of the generators is isolated and that of the other is grounded through a 2Ω resistor. A single line to ground fault occurs at the terminals of one of the generators. Estimate (i) the fault current (ii) the current in the grounding resistor and (iii) voltage across the grounding resistor

OR

Q.4

- (a) 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 (8)
- (b) Discuss the criteria for selection of circuit breakers (6)

Q.5

- (a) What is corona? What are the effects produced by corona? Also explain how you can find critical disruptive voltage (7)
- (b) What are the disadvantages of ungrounded system? With the help of phasor diagram explain how neutral shift takes place when a fault occurs on ungrounded system (7)

OR

Q.5

- (a) Explain how resonant grounding is carried out in power systems (7)
- (b) Derive the expression for attenuation of a travelling wave on transmission line (7)

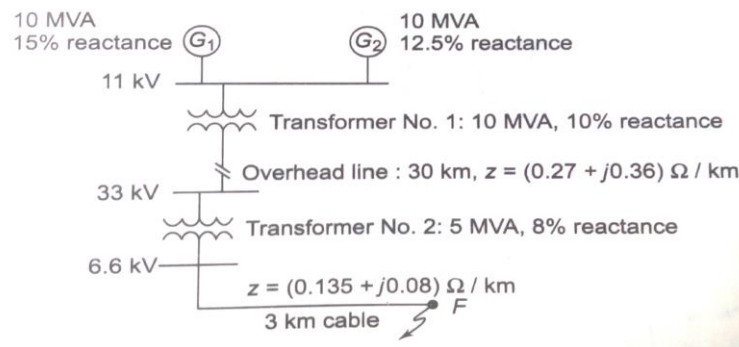


Figure 1

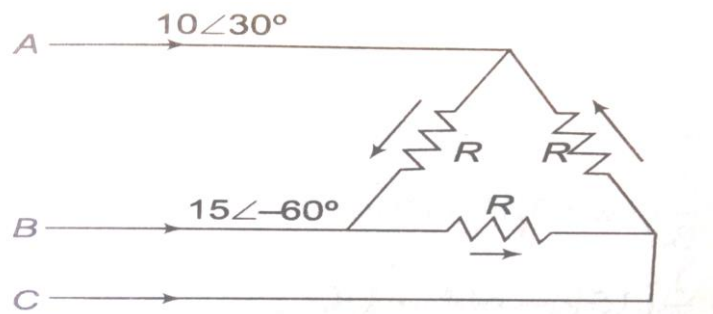


Figure 2
