

C.U.SHAH UNIVERSITY

Winter Examination-2018

Subject Name : Power System Analysis

Subject Code : 4TE06PSA1

Branch: B.Tech (Electrical)

Semester : 6

Date : 26/10/2018

Time : 02:30 To 05:30

Marks : 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
 - (2) Instructions written on main answer book are strictly to be obeyed.
 - (3) Draw neat diagrams and figures (if necessary) at right places.
 - (4) Assume suitable data if needed.
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Q-
1

Attempt the following questions:

(14)

a) Per unit system is ratio of (Actual quantity in any unit /Base quantity in the same unit) .

The above statement is True/False. (Select correct option)

b) Write any two formulae of electrical power.

c) The per unit value of transformer impedance is _____ on primary and secondary side.
1)different 2) same 3) depends upon turns ratio 4) depends upon voltage ratio

d) The graph is a representation of network components of electrical system .

The above statement is True/False. (Select correct option)

e) The circuit breaker current rating is decided using symmetrical fault analysis study.

The above statement is True/False. (Select correct option)

f) State the name of any two unsymmetrical fault.

g) Single Line Diagram is a representation of balanced 3 phase network in a single phase system.

The above statement is True/False. (Select correct option)

h) The Fortesque theorem is solution for unbalanced set of phasors in mathematical form.

The above statement is True/False. (Select correct option)

i) The Gauss Siedel Method is used for the solution of load flow study.

The above statement is True/False. (Select correct option)

j) The equal area criterion is used for stability study.

The above statement is True/False. (Select correct option)

k) The zero sequence components represents dc segment of electrical parameter.

The above statement is True/False. (Select correct option)

l) State the name of any two equipments that is used in Substation.

m) State the name of any two equipments used in Thermal Power Generation.

n) State the name of any two thermal power station in Gujarat State.

Attempt any four questions from Q-2 to Q-8

Q-
2

Attempt all questions

(14)



- (a) State the comparison of various load flow methods. (7)
- (b) Briefly explain the classification of bus for load flow study. (7)

Q-3 Attempt all questions (14)

- (a) Define per unit system. Derive the formulae of per unit impedance for the single phase case. (7)
- (b) Derive Network Model for Four bus structure Power System having generator at each bus. (7)

Q-4 Attempt all questions (14)

- (a) Derive the per unit model of a transformer. (7)
- (b) Draw the zero sequence component for the following configuration of 3 phase transformers. (i) Star ungrounded- star grounded (ii) Star grounded- Star grounded (iii) Star grounded – Delta (iv) Delta – Delta (7)

Q-5 Attempt all questions (14)

- (a) Draw any three tree for the graph structure shown in Figure 1. (7)
- (b) Briefly explain what is steady state , transient and Sub transient reactance of generator. (7)

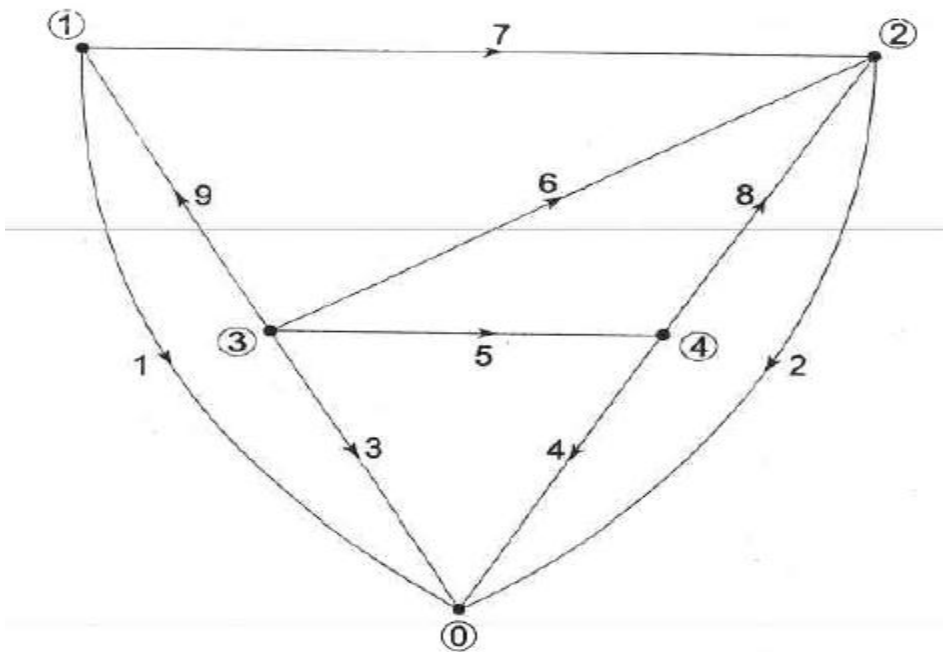


Figure 1 , Question 5 (a)

Q-6 Attempt all questions (14)

- (a) Derive the value of Current I_{a1} when a three phase transmission line is subjected to single line to ground fault. (7)



(b) With usual notations prove that $\mathbf{VP= AVS}$

Q-7 Attempt all questions (14)

(a) Explain the equal area criterion with usual notation. (7)

(b) Discuss the positive sequence network and negative sequence network of a synchronous generator. (7)

Q-8 Attempt all questions (14)

(a) Three 6.6 kV generators A, B, C each of percentage reactance 10% and MVA rating 40,50 and 25 respectively are interconnected to one another as shown in figure 2 below by a tie bar through a current limiting reactor, each of 12% reactance based upon the rating of the machine to which it is connected. A three phase feeder is supplied to the bus bar of generator A to the line voltage of 6.6. kV. The feeder has a reactance of 0.06 ohm/phase and reactance of 0.12 ohm per phase. Estimate the maximum MVA that can be fed into a symmetrical short circuit at the far end of the feeder. Choose Base MVA of 50 and base voltage 6.6 kV. (7)

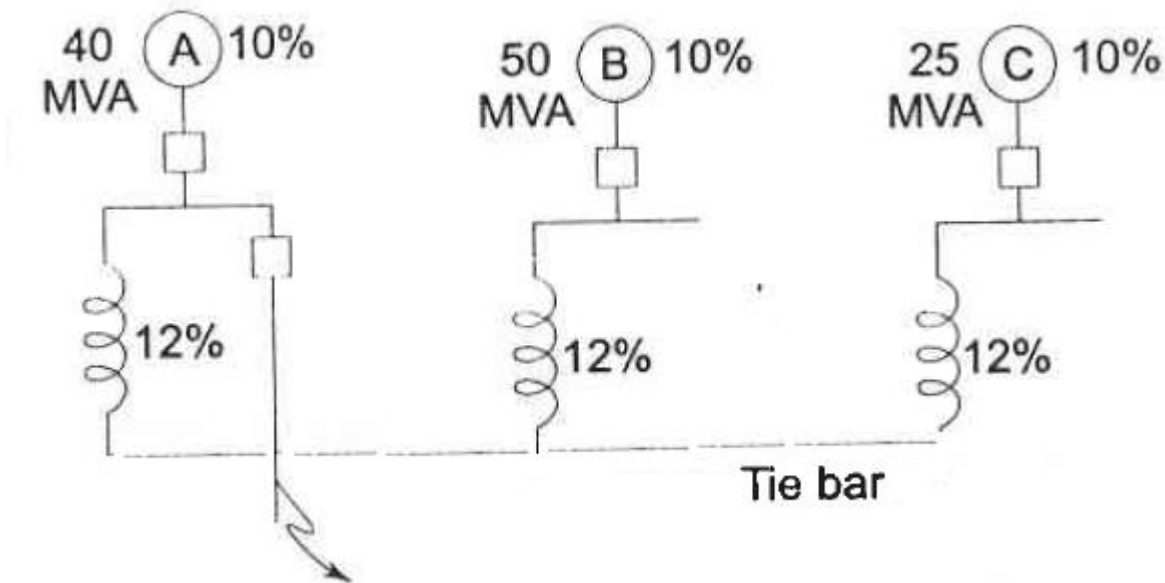


Figure 2 Question 8 (a)

(b) In the system shown in Figure 3, a three-phase static capacitor of reactance 1 pu per phase is connected through a switch at motor bus bar. (i) Calculate the limit of steady state power with and without reactor switch closed. (ii) Recalculate the power limit with capacitive reactor replaced by an inductive reactor of the same value .

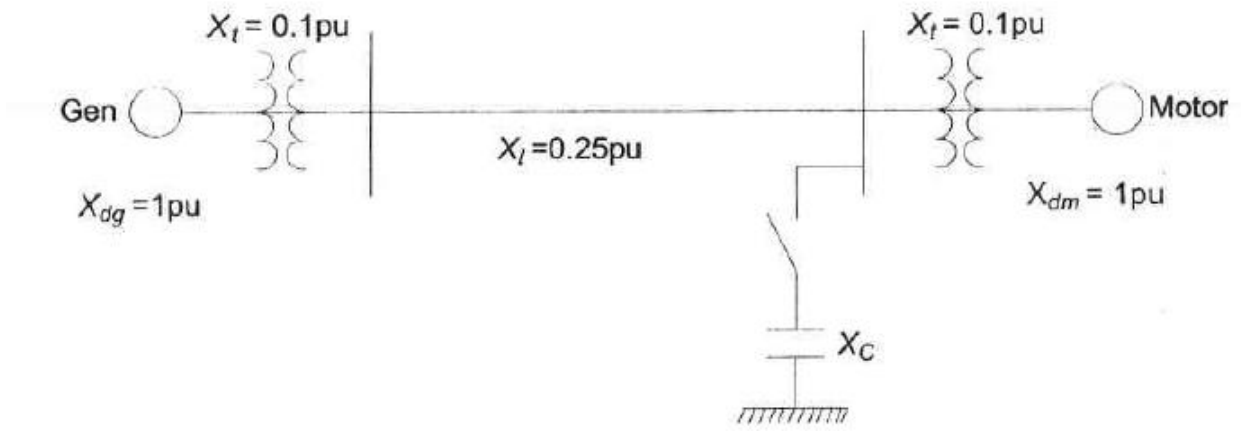


Figure 3, Question 8 (b)

