B.Tech Sem – VI (2007 Course) (Electrical Engg.) : WINTER - 2018

SUBJECT: POWER SYSTEM ANALYSIS

Day: Thursday
Date: 15/11/2018

W-2018-2854

Time: 10.00 AM TO 01.00 PM
Max Marks: 80

N.B:

1) **Q.No.1** and **Q.No.5** are **COMPULSORY**. Out of the remaining questions attempt **ANY TWO** questions from each section.
2) Answers to both the sections should be written in the **SEPARATE** answer books.
3) Use of non-programmable **CALCULATOR** is allowed.
4) Figures to the right indicate **FULL** marks.
5) Assume suitable data if necessary.

SECTION – I

Q.1 **a)** Discuss the concept of power system analysis and its necessity. **[05]**

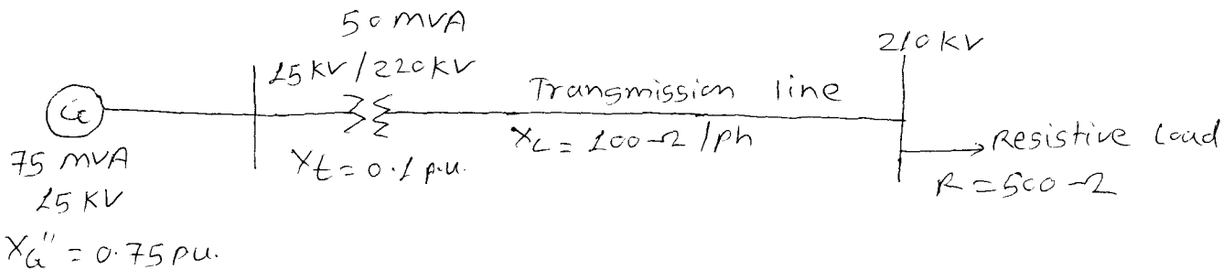
b) State the assumptions used to convert the impedance diagram to reactance diagram of a power system. **[05]**

c) Discuss importance of Y-bus matrix in load flow analysis. **[04]**

Q.2 **a)** What do you mean by complex power? Derive expression of complex power and explain why the complex conjugate of either voltage or current is required to estimate the complex power? **[07]**

b) Discuss the various methods of voltage control applied on the power system. **[06]**

Q.3 **a)** For the system shown in figure determine the generator voltage. **[07]**



b) Derive and sketch the model of three winding transformer. **[06]**

Q.4 **a)** Classify different types of buses in power system for load flow studies. How slack-bus is distinguished from other types of buses in load flow analysis? **[07]**

b) Show that diagonal elements of a Y-bus matrix is equal to the sum of admittances directly connected to that bus and an off-diagonal element is equal to the negative sum of admittances directly connected between that buses. **[06]**

P.T.O.

SECTION – II

Q.5 **a)** What is current limiting reactor? Explain the requirement for selection of : **[05]**
i) Circuit breaker **ii)** Current limiting reactor

b) Sketch the sequence network of three phase synchronous generator. **[05]**

c) Define stability. Explain in short different types of power system stability. **[04]**

Q.6 **a)** Derive an expression for short circuit current of an unloaded 3-phase alternator. **[07]**
Sketch: **i)** DC offset component ii) Symmetrical short circuit component.

b) What are the main kinds of faults occurs in a power system? Explain various steps involved in the short circuit calculation for symmetrical fault analysis. **[06]**

Q.7 **a)** An 11KV, 40MVA synchronous generator has positive, negative and zero sequence reactances of 0.10, 0.10 and 0.06 pu respectively. Generator neutral is grounded through a reactance of 0.04 pu. A Line – to – Ground (L – G) fault occurs at generator terminals when generator is at no load. Determine line currents and line-to-line voltages. **[07]**

b) For a Line – to – Ground (L – G) fault, draw the sequence diagram and derive relationship between symmetrical component currents and phase currents. **[06]**

Q.8 **a)** Derive swing equation of a synchronous machine. **[07]**

b) Estimate the steady state stability limit of a synchronous generator and state the measures to increase the same. **[06]**

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