Roll No ....

MEPS/MTPA/MEHP/MTPS-102
M.E./M.Tech., I Semester
Examination, December 2015
Power System Dynamics Analysis and Control

Time : Three Hours

Maximum Marks : 70

Note : i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) Discuss briefly how the following components of power system affect voltage stability of the system:
   i) HVDC line
   ii) OLTC
   iii) Generator bus voltage
   iv) Shunt capacitor
   v) Series capacitor
   b) Give the comparison of angle and voltage stability.

2. A generator is supplying power to a load centre through a transmission line as shown in Fig. 1. The power output of the generator is increased slowly while maintaining the magnitudes of the voltages V_1 and V_2 constants at 1.0 p.u. by manual control (of both generator excitation and infinite bus voltage). Find the steady state stability limit of power that can be transmitted. Assume $X_t = 0.1$, $X_l = 0.4$, $Z_T = j0.1$, $X_g = 0.3$.
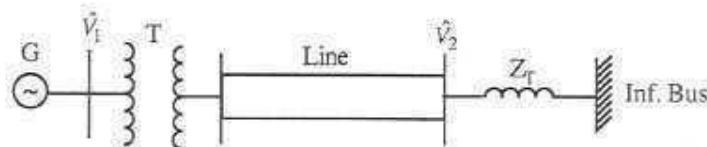

Fig. 1

3. Explain various test procedures to obtain the data of synchronous machine.

4. Describe the modeling of the various components of the excitation system.

5. a) Derive voltage and torque equations of a synchronous machine.
   b) A generator has the following data.
   $X_d = 1.79$, $X_{a\sigma} = 0.13$, $X'_d = 0.169$, $X''_d = 0.135$, $T'_{do} = 4.3$, $T''_{do} = 0.032$, $Xq = 1.71$, $X'_q = 0.228$, $X''_q = 0.2$, $T'_{qo} = 0.85$, $T''_{qo} = 0.05$, $f_B = 50$ Hz.

   Compute the equivalent circuit parameters.

6. Enumerate transient response of a synchronous machine under:
   a) Connected to a voltage source
   b) Connected to an external network

7. What is the objective of excitation system in synchronous machine? Describe the types, and modeling of the various components of the excitation system.

8. Write short notes on any two of the following :
   a) Static Load Representation
   b) Modeling of SVC
   c) Excitation control
   d) Tuning of power system stabilizer

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