Code No: A4901 **NR**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.TECH I SEMESTER EXAMINATIONS, APRIL/MAY 2012

POWER SYSTEM DYNAMICS

(ELECTRICAL POWER ENGINEERING)

Time: 3hours **Max.Marks:60**

Answer any five questions

All questions carry equal marks

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1.a) A 60 Hz, 6 pole generator with H= 4.0 p.u supplying 1 p.u. electrical power at an internal voltage of 1.2 p.u and is connected to an infinite bus having voltage of 1.0 p.u throuth a line of 0.3 p.u reactance. Find the power angle. A three phase short circuit occurs on the line. Use point by point method. The swing curve data of δ and t up to three intervals with step size of 0.05 sec.

b) State the assumptions used in applying the equal area criteria to a single machine connected to infinite bus.

2. a) Obtain the direct axis equivalent circuit of the synchronous machine.

b) Discuss the following:

i) Remarks of flux linkage transformation.

ii) Calculation of transient and sub-transient quantities from equivalent circuit parameters.

3. a) Draw the block diagram and the saturation characteristics of the following exciters.

i) Type DC1 – DC commutator exciter

ii) Type AC 1 exciter

b) A generator is connected to an infinite bus through an external impedance of jxe. If $E_b = V_{to} = 1.0$ p.u. Find the initial conditions. Assume $x_e = 0.28$ p.u. Consider the generator data: $x_d = 1.8$, $x_q = 1.72$, $x'_d = 0.18$, $x'_q = 0.25$, $R_a = 10.0$, $T''_d = 0.52$ sec, $T''_q = 0.1$ sec, H = 6 Sec and $f_B = 50$ Hz.

4. a) From the fundamentals obtain the expressions for k1, k2, and k3.

b) Explain about synchronizing and damping torque analysis application case 2.

5. Discuss the following:

i) Analyzing of single machine infinite bus system with and without PSS.

ii) Basic concepts in applying PSS

6. a) Explain in detail about the point by point method of solution for transient stability.

b) Show that C_p is power invariant.

7. Explain in detail with the equations, how the single machine system is analyzed.

8. Explain the following

i) Calculation of Initial conditions.

ii) Simplified representation of Excitation control.

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