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Total No. of Pages : 02

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M.Tech.(Power System) (2013 & Onwards) (Sem.–2)

POWER SYSTEM DYNAMICS AND STABILITY

Subject Code : MTPS-203

M.Code : 71369

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.
3. Assume any missing data appropriately.

Q1. (a) State and explain angular and load stability if power system. (10)

(b) What is necessity of steady state stability and how this is evaluated? (10)

Q2. (a) Draw and explain generator capability curve label the diagram indicating various limitations on generation of active and reactive power, and stability limits. (10)

(b) Explain dynamic modeling of synchronous motors using d-q axis transformation. (10)

Q3. (a) Explain significance of first swing stability of generators. Draw Power-angle curve and explain Equal Area Criterion. (10)

(b) A generator is delivering 1.0 pu power to an infinite bus through a network having negligible resistance, at 50Hz. A fault occurs which reduces the maximum power transferable to 0.45 pu, whereas before the fault this power was 1.85 pu and after the clearance of fault it is 1.25 pu., using the equal area criterion, determine the critical clearing angle. (10)

Q4. (a) Explain the term "Dynamic Stability" as applied to power system. (08)

(b) In a SMIB system having $R_e = 0$, $X_e = 0.5$pu, $V_t = 1.0 \angle 15°$, $V_\infty = 1.08 \angle 0°$ The machine parameters H = 3.2sec, T'_{do} = 9.6sec , K_A = 200, T_A = 0.25sec, R_s = 0.0, X_q = 1.7pu, X_d = 2.0pu, X'_{do} = 0.39pu, D = 0, $\omega_s = 1007\pi$. Using flux decay model, find initial values of state and algebraic variables, as well as V_{ref}, T_M. (12)

Q5. (a) Draw a model of SMIB Power System using K_1 to K_6 Constants, give reasons for assuming constant mechanical power. Write expression for six constants used. (10)

(b) Draw block diagram of Power system stabilizer and explain lag-lead time-constants, wash-out gain and wash-out time constant? (10)

Q6. (a) Define proximity indices used for voltage stability of power system. (10)

(b) For a two area power system determine the voltage stability with following data :

	Area **1**	Area 2
Kps	95	110
R	2.0	3.0
β	0.326	0.425

Show the undesired control action occurs with B = 2β. (10)

Q7. (a) Defme and explain Voltage Stability of Power System with the help of P-V curve. (10)

(b) Explain how resonance can occur in power system. What are its effects on power system apparatus? (10)

Q8. (a) What are problems caused by self excitation and how these can be overcome using filters and damping devices. (10)

(b) Write short notes on :

(i) Methods to counter act the sub synchronous oscillations. (5)

(ii) Voltage stability using Bifurcation theory. (5)

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.