M.Tech. (Power System) (2018 Onwards)   (Sem.–1)
POWER SYSTEM DYNAMICS-I
Subject Code : MTPS-102-18
M.Code : 75775

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1.   **Attempt any FIVE questions out of EIGHT questions.**
2.   **Each question carries TWELVE marks.**

1.   a) Derive the flux linkage equation for synchronous machine system.   6

     b) Derive swing equation for single machine system.   6

2.   a) Give description of state space equation for power System model.   6

     b) A generator is connected to an infinite bus through an external impedance of jXe. If
         Eb = Vto = 1.0 p.u. Find the initial conditions. Assume xe = 0.28 p.u. Consider the
         generator data : xd = 1.8, xq = 1.7 , x′d = 0.18, x′q = 0.25, Ra = 10.0, T"d = 0.5 sec,
         " = 0.1 sec, H = 5 Sec and fq T B = 50 Hz.   6

3.   What is the importance of park's transformation? Apply it to transform electrical and
     mechanical equations of synchronous machine.   6+6

4.   a) What are sub-transient and transient inductance for a synchronous ?   6

     b) Write down its importance for performance evaluation of the machine.   6

5.   How excitation control is achieved in synchronous machine? Show the inclusion
     additional variables in the mathematical model of a synchronous machine and discuss
     about its final state space model.   6+6

6.   What is importance of small signal model in stability consideration of a machine?
     Discuss in details criterion for stability analysis in case of above through frequency
     model.   5+7

7.   What are components involved in developing the models of induction motor? Derive the
     model equation for this machine.   6+6

8.   Write notes on following :

     a) Power System stabilizer   4

     b) Prime mover controller   4

     c) PSS Load modeling   4

**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.**