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Total No. of Questions : 08

M.Tech. (Power System) (Sem.–1)
POWER SYSTEM DYNAMICS-I
Subject Code : MTPS-102-18
M.Code : 75775
Date of Examination : 19-01-2023

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) Explain advantages of per unit system of parameter measurement.

    b) Prove that power remains unaltered when three phase system quantities are transformed to two-phase equivalent quantities.

2. Explain the transformation of quantities from rotating axes (α, β, 0) to stationary axes (d, q, 0)

3. A 555 MVA, 24kV. 0.9 p.f. 60Hz, 3-phase 2 pole synchronous generator has the following inductances and resistances associated with the stator and field windings:

laa (mH)	lab(mH)	l_{afd} (mH)	L_{ffd}(mH)	$R_a(\Omega)$	$R_{fd}(\Omega)$
$3.2758+0.0458\cos(2\theta)$	$-1.6379-0.0458\cos$ $(2\theta+(\pi/3))$	$40.0\cos(2\theta)$	576.92	0.0031	0.0715

    a) Determine L_q in henrys.

    b) If the stator leakage inductance L_l; is 0.04129 mH, determine L_{aq} in henrys.

    c) Using the, machine rated values as base values for the stator quantities, determine the per unit values of the L_{aq} following in the L_{ad}-base reciprocal per unit system.

4. a) Write state-space model of synchronous generator using d-q axis theory.

    b) Explain connection matrix [C] used in Park's transformation.

5. a) What do you mean by small signal analysis of power system.

   b) Explain the concept of power system stability using eigen value analysis.

6. Draw and explain block diagram for Power system stabilizer model of SMIB power system.

7. A 3-Φ, 50 MY A, 33KV, 50 Hz, hydro generator has the following reactances in p.u. on the generator rating as the base: $X_d = 2.0$; $X_d = 0.4$; $X_{d''} = 0.25$; $T'_{d0} = 5.00$sec. This generator supplies rated KVA to an infinite bus at rated terminal voltage and unity power factor. Determine the load angle and transient power.

8. a) Derive the Induction Motor Model in matrix form based on two-axis theory.

   b) Explain the prime mover output control methods employed.

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.