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SLOT C

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

.....FIRST..... SEMESTER M.TECH DEGREE EXAMINATION, DECEMBER 2017

Branch: ELECTRICAL&ELECTRONICS

Stream(s):

1. **POWER SYSTEMS**
2. **ELECTRICAL MACHINES**

01EE6301 MODELLING OF ELECTRICAL MACHINES:

Answer *any two full* questions from *each* part

Limit answers to the required points.

Max. Marks: 60 Duration: 3 hours

PART A

1. a. (i)What is Krons Primitive machine? Obtain the voltage equation for Krons Primitive machine? (7)

   (ii)Give the R matrix, L matrix and Torque matrix for Krons Primitive machine (2)

2 a. (i)Draw the basic two pole machine diagram and primitive machine diagram for the following machines?

   (1)DC compound machines

   (2) Three phase Induction Motor

   (3)Single phase Induction Motor

   (4)Synchronous motor (4)

   (ii)Give the conventions of generalized machine theory (2)

   b. .(a) Show that power is invariant in three phase to two phase transformation? (3)

3. (a) Obtain the transformation from α, β axis to d,qaxis and hence obtain the transformation from abc axis to dq axis?(7)

   (b) Give the physical concept of parks transformation? (2)

PART B

4. a. A separately excited dc generator running at *4500/Π rpm* has the following parameters

r_f= *80* Ω, L_f = *40 H*, r_a= *0.1* Ω, L_a = *0.3m H, Kg =120V/feild ampere.*

(i) Feild is unexcited and armature is open .Find the armature voltage as a function of time and sketch it if a constant voltage of *160V* is suddenly impressed across the feild terminals?

(ii) Sketch the rise of armature current in part (i) if the armature terminals are initially short circuited?

(iii) Armature voltage has attained a steady value in part (i) Now the armature is suddenly connected to load of *1.1* Ω in series with inductance of *1.7mH*. Determine armature terminal voltageand armature current as a function of time.

(iv) Find the electrical torque as a function of time? Obtain the mean value of torque also? (6)

b. Obtain the transfer function of separately excited dc generator? (3)

5. a. Obtain the expression for armature current of a separately excited dc generator if its armature terminals are suddenly short circuited? (6)

b. Write notes on synchronous machine reactance? (3)

6. a. Obtain the steady state power angle characteristics of synchronous machine? (6)

b. Derive the expression for reactive power of synchronous machine? (3)

PART C

7. a. Obtain the equivalent circuit of three phase induction machine from the primitive model? (9)

b. Obtain the torque slip characteristics of three phase induction machine? (3)

8. a. What happens to a three phase induction motor if one of its three supply leads disconnected? Explain? (3)

b. A three phase induction machine continues to run if one of the line fuses blows off but does not start under one line off condition. How this feature explained with the help of double field revolving theory? (4)

c. Compare the performance of Single phase and poly phase induction m (3)

d.From the equivalent circuit of poly phase induction machines Derive an e for air gap power? (2)

9. a. Apply the cross field revolving theory and conduct steady state analysis of single phase induction machine (7)

b. Explain the double field revolving theory as applied to a single phase induction machine (5)