



Reg. No. :

Name :

**First Semester M.Tech. Degree Examination, March 2013
(2008 Scheme)**

Branch : Electrical and Electronics

Stream : Power Control and Drives

EDC 1004 : ELECTRICAL MACHINE ANALYSIS

Time : 3 Hours

Max. Marks : 100

Instructions : 1) Answer **any five** full questions.
2) **All** questions carry **equal** marks.

1. a) What do you understand by the term linear transformation ? What are the assumptions used for the same ? 10
b) For steady state operation with $i_\alpha = I_m \cos(\omega t + \phi)$ and $i_\beta = I_m \sin(\omega t + \phi)$. Determine the primitive coil current i_d and i_q and show that these are steady state values. 10
2. Derive the transformations for currents between a rotating balanced 3 phase (a, b, c) winding and a pseudo-stationary 2 phase(d, q) winding. Assume equal turns on all coils. 20
3. a) Briefly explain the different braking methods of dc motor. 10
b) A 230 V, separately excited dc motor is driving a constant load torque with the following data. $R_a = 0.4 \Omega$, $L_a = 0.01$ H, $r_f = 115 \Omega$. Motor torque constant $K_m = M_d I_f = 2$ Nm/armature ampere. Friction and windage constant, $D = 0$. The armature current is 50 amperes with rated voltage across the armature and field. Determine the magnitude of constant load torque. If the armature voltage is suddenly reduced to 20 V, find the speed as a function of time. Total $J = 12$ kgm². 10
4. a) A salient pole synchronous generator has $X_q = 0.8$ pu and $r_a = 0.02$ pu. If this generator delivers rated kVA at 0.8 pf lagging and at rated voltage, compute the load angle. 10
b) Explain the physical concept of sub transient, transient and steady state reactances of a 3 phase synchronous generator. 10

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5. a) Obtain the voltage equations for the 2 pole model of a polyphase induction machine and hence obtain the equivalent circuit for the same. 10
- b) Derive the equivalent circuit of a double cage poly phase induction motor with the help of its generalised mathematical model. 10
6. a) Obtain the expression for electromagnetic torque of a single phase induction motor from its 2 pole model. 12
- b) Explain briefly the double field revolving theory of single phase induction motor. 8
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